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Anthropo-Geography of the Dekhan

By

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The recent science of Anthropo-Geography aims at the study of 'man and culture from the standpoint of geographic environment and the accompanying natural condition.'[1] Ever since T. H. Buckle published in 1857 his '*History of Civilization in England,*' it has been generally held—and there is everything to be said in its favour—that differences of culture are due to environmental factors. This means that cultural acquisitions are determined by geographic factors like soil, food and climate. But recent researches in Anthropology and more particularly cultural anthropology have shown that environment is not the sole factor influencing the development of a culture but there are other equally important factors, of which special mention must be made of man's faculty of reason. A given area may be favourable to cultural advance or may not be. But by the judicious use of his reasoning faculty the early man used his location to his advantage. If the location offered disadvantages, he endeavoured to get over them, and if it offered advantages he made use of them to the utmost possible extent. In this way we have to account for oldest historic cultures like the Dravidian and Aryan. I have endeavoured in this paper to show that neither factor by itself can be useful to cultural advancement and that environment plays as much a significant role as the race factor. Probably the influence, as we shall soon see, exerted by the geographic environment was greater and more pronounced.[2]

1. A. Muntsch, S.J., *Cultural Anthropology,* 1934, U.S.A., pp. 25-26.
2. See also the opening chapter of Pomfret's *The Geographic Pattern of Mankind,* 1935.

The close relation between geography and history and the influence of geography over human progress is to-day being emphasised. By History one should not understand the dry bones of Chronology together with the catalogue of political events. But it includes necessarily the entire culture of the people of a country from earliest times to the present day. In approaching history in this particular, we have to invoke the absolute aid of geography. Therefore to understand the prehistoric conditions of life in the Dekhan we must necessarily study the physical features of our Peninsula as obtained here before the period of dated history. Under physical features we have to examine the shape and contours of the region, climate and rainfall, mountain and river systems, peoples and animals, vegetation and minerals. This is indeed the modern method of approaching the subject. But it would be highly interesting to see what the conception of ancient Indian geographers was and how they approached the study of geography of a region. They divided the whole territory into five definite regions—the mountainous areas, the forest tracts, agricultural areas, desert regions, and coastal lands. Each region was denominated after the predominating physical characteristic that marked it, as such. We can cite the evidence of the Ramayana to corroborate the statement. In ordering the monkey hosts to go in search of Sītā, the wife of Rāma, Sugrīva whose knowledge of world geography should have been profound and minute to the smallest details, says that a search should be made in the different regions of the land such as riverine tracts, mountainous areas, coastal regions, forest territory and others.

नादेयैः पार्वतीयैश्च सामुद्रैः महाबलैः।
हरिभिर्मेघनिर्ह्रादैः अन्यैश्च वनचारिभिः।

IV. 39. 12.

It seems to me that the term Pañcajanah in the earliest literature of India—the Rig Vedasamhita, which repeatedly refers to it, probably means five natural regions of the land in which men of different types and different cultures lived, their lives being dependent upon their environment. And this environment can be explained as the physical features of the given land of which climate and vegetation can be regarded primary factors. In the same way the Tamil Sangam literature throws welcome light on the question and according to the evidence of this literature, the whole territory was divided up into five natural regions (1) The Pālai or desert regions where lived the Kallar and Maravar—nomad tribes, (2) the mullai or wooded tracts where lived āyar—

the community of cowherds and shepherds, (3) Marudam or riverine tracts where lived husbandmen devoted to agriculture, (4) Neydal or littoral regions where lived Paradavar engaged in fishing and salt scraping, and (5) Kuriñji or hilly tracts where lived the hardy mountaineers.

Thus we find a wonderful unanimity of views among the Indian writers whether it be of the South or North. Another wonderful coincidence lies in the fact that the Tolkāppiyam leaves Pālai out of account, as also Vālmīki. Sugrīva refers only to four regions—all except the Pālai. This was not because these writers were not aware of this region but being primarily concerned with aspects of human geography as we would understand to-day, this region of Pālai totally unproductive and consequently unfit for man to live, was not taken notice of by these early writers.

Our sources of information for this object are very meagre. We cannot afford to brush aside the patient researches of Geologists, Indian and foreign, to arrive at approximate results as to the shape and contours of the Dekhan Plateau. The conclusions reached are more or less tentative in character and cannot be accepted as positive facts until some new light lifts up the veil from an entirely different angle to corroborate the seemingly fanciful theories of geological science. The latest researches of South Indian scholars show that there was what is known as the Purana era, when the middle portion of the Southern Peninsula towards the east was covered by a sheet of water, while Central India together with the site of the Vindhyan range indicates the prevalence of the Purana ocean in those areas. There is again another interesting theory of the geologist that there was once an Indo-African continent or rather India formed a part of a huge continent which included Africa, Australia and South America. This was also named the Lemurian continent. It is surmised that, since what is known as the cretaceous period, the transgression of the sea into the land was continuous and persistent, with the result that lands got broken up, and the seas widened and expanded. Yet another theory is that the Vindhyas, the Western and Eastern Ghats and other peninsular mountains and rivers are much older in age than the Himalayas and the Himalayan rivers.[3]

3. See T. N. Muthuswami's paper: The Geographical Evolution of India in the Journal of Madras Geographical Association, July 1932 and also H. Narayana Rao's paper on the same subject in the Indian Journal of Education, Aug. 1922.

As has been already said these theories are more or less conjectural and cannot be taken in our present state of knowledge in geographical history as in any way conclusive. I do not propose this evening to take you to the various geological periods and the gradual evolution of our peninsula during the course of millions of years which geologists claim though not without tangible evidence. But I am primarily concerned with the Dekhan at a period before history, for we still begin our history of India with Alexander's invasion towards the close of the fourth century B.C. For a study of this period the chief sources of information are the early Literature, Tamil and Sanskrit, besides literary traditions as embedded in later literature. The Sanskrit literature is made up of the vast Vedic literature with its Samhita, Brāhmaṇa and Upanishads, the epics Mahābhārata and the Rāmāyaṇa, the complex and yet unexplored mass of the Purāṇas, the Dharma-Śāstras and Arthaśāstras besides other miscellaneous works of equal importance. In the Tamil literature which goes by the name of Śangam classics we have again references to the physical features of South India. Special mention may be made of the ancient work of Tamil grammar, the Tolkāppiyam. Though this treatise cannot be pushed to a date earlier than the fourth or fifth century B. C. yet most of the matter it treats of refers to the pre-śangam period, and can be therefore relied on as a principal source of information in any study of the history or geography of ancient South India.

Archaeological and literary evidences show that at least for the last five thousand years the continent of India remained very much the same, except for the fact that a river has changed its direction like the Indus or the coastal region a little more eroded in certain places. Evidence as furnished by the ancient literature of the land shows that India was divided into three divisions— Āryavartha, Madhyadeśa and Dakshinadeśa. According to a statement in the *Manavadharma Śāstra* the region Āryavarta had for its northern boundary the lofty Himalayas and for the southern limit the Vindhyan ranges.[4] Thus in the time of Manu and even before, the whole of Hindustan was the home of the Aryans meaning thereby the followers of svadharma as prescribed by the *Varṇāśramadharma*. It also went by the name Uttarāpatha. (See Viṣṇu P. IV.2.13). The next great division was the Madhyadeśa, literally middle country. It is not possible to define the limits of

4. See also Kausiki Up. II. 13.

this region in any definite manner. As a matter of fact there was a shifting of its limits at different periods of Indian history. In mediaeval India the territory between Bengal and Orissa went by the name of Madhyadeśa.

The next geographical division with which we are concerned to-day is the Dakshinadeśa or the Dekhan—From the term Dakshinapada in the Rigveda samhita we have to infer that there was a land route between North and South India from the earliest times. The Rigveda shows from the term Paravrj that it was the land of the exile.[5] The ancient Indian geographers meant by Dakshinadeśa the whole of the peninsula south of the Vindhyas or more correctly, south of the Narmadā. After examining the date furnished in the Purāṇas like the Mārkaṇḍeya, Vāyu and Matsya and in the Mahābhārata, the late R. G. Bhandarkar narrowed the definition of the Dekhan to the Maharastra or the region in which the Marathi language is spoken. But this narrowing down of the boundaries of the Dakshinapatha has no justification; for the Purāṇas cited as authority by Dr. Bhandarkar (ch. 57-45) (Ch. 45. 124, Ch. 112, 46) are very clear in making the Coḷa, Pāṇḍya, and Kerala countries of the extreme south of India as forming part of the Dakshiṇapada. On the authority of a verse in the Mahābhārata (*sabhā,* (31-17) it is argued that Sahadeva is said to have gone to the Dakshiṇapatha after the conquest of the Pāṇḍyan kingdom.[6] This statement requires a re-examination of the proper meaning of the term Dakshiṇapatha. From Pre-historic date Dakshiṇapatha meant the road or route by which there was intercourse between north and south, and not the geographical territory.[7] It seems to me, therefore, that after the conquest of the Pāṇḍyan kingdom, Sahadeva returned home by the Dakshiṇapatha route. According to Patañjali again Kānchīpura (modern Conjeevaram) and Kerala or Malabar were included in the Dakshinadeśa. (*Mahābāshya,* IV. 2. 2: IV. 1.4.) It would be wrong under these circumstances to identify ancient Dekhan with Maharāshtra. The ancient geographers meant all the peninsula up to Cape Comorin.

What were the physical features of the ancient Dekhan? They were much the same as already stated. The central portion

5. See also Vedic Index, Vol. I, p. 337.
6. Early History of the Dekhan (1928) pp. 1-3.
7. See Baudhāy. Dh. Śāstra (1, 1, 2, 13).

of this peninsula was occupied by a large plateau. The coastal strips were narrow and were flanked by the Western and Eastern Ghats. The Vindhya and Satpura ranges formed an impenetrable wall on the north, and marked distinctly the northern boundary of the Dekhan. This was one of the causes why there was a very slow Aryan penetration spread over several milleniums, and also why the Dekhan and especially South India has been able to retain and preserve some traits and elements of her prehistoric culture. Again it must be noticed that the height of a mountain determines frequently the unfailing supply of water even during the dry season. Speaking of South India, there are not many lofty hills, and therefore there is lack of water during the summer season. And this factor makes irrigation as one of the highest importance.

Irrigation in ancient India was carried on even as now by means of artificial reservoirs which are called in sanskrit *saras*, rendered in English as tanks. This explains why the Sanskrit Purāṇas frequently refer to these *saras* as existing at short distances. But we have to reckon with one thing in this connection. In places where there is no direct river irrigation, there is the certain danger of these tanks getting filled with silt. One important result of this elaborate irrigational system which one notices from the earliest times in this vast peninsula is that it has fostered the healthy spirit of communal existence and life and promoted co-operation among the different classes of the people living side by side. This explains again the existence of village communities in such large numbers in Southern India from the primitive days to the present time. Confining ourselves for the present to the Dekhan plateau, we have to take it that at least five thousand years ago, it remained much the same as to-day.

The surface is by no means smooth and one notices a sloping down towards the east. Judging from the course of the rivers and the coast line two things are evident. The western edge of the plateau was much higher than the eastern edge. Secondly the western edge again was much higher above the surface of the sea. Comparing the south and north of the tableland, it was higher in the south than it was in the north. There were deep river valleys, the rivers taking their source in the hills of the tableland and wending their ways to the Bay of Bengal on account of the slope on the east. Unlike the rivers of North India the rivers of the plateau do not have a long upper course in the mountains. The important streams of the plateau are the Mahānadi, Godāvari, Krishna, and Kāveri. We have the evidence of the epics and

the Purāṇas that these streams existed in the epic and pre-epic epoch of India's history. Of all the rivers the Narmada finds prominent mention and it flows westwards. The river Mālyavati is said to flow in the vicinity of the Citrakūṭa hill. Maha-java is another stream between the Citrakūta hill and Nila forest (*Rāma Aran;* Ch. 7 & 8) though it is not possible to identify this river. Immediately after the Godāvari, the river Mandākinī is mentioned; and we have to identify this latter with Mañjira which forms now a southern tributary of the Godāvarī. South of the Godāvarī were the Kṛishṇaveṇī, Mahānadī and Varadā. Still further south ran the river Pañcavāhinī. Probably it was near the forest kingdom of Kishkinda. In the Tamil land the streams of importance are the Kāveri and the Tāmraparṇī. According to the sangam classics there were smaller rivers like the Kumarī, the Pahruli, the Perar, the Porunai, the Aiyaru, the Śilambāru, etc.

Side by side with these rivers which deeply furrowed the otherwise smooth surface of the Dekhan plateau, there were lakes which were of considerable importance. The Rāmāyaṇa gives prominence to the Pañcāpsaras and the Pampā. The former lay on the northern edge of the Daṇḍaka forest, and the latter adjacent to the Ṛishyamukha hill (*Arn.* ch. 73). This can be identified with the Pushkaraṇi on the Hyderabad side of the Tungabhadrā near Anegundi. In the southern districts of the Peninsular India, the Śilappadikaram mentions a number of lakes which lay on the way to Madura from Puhār. These are the Iṣṭasiddhi, Somakuṇḍa, Sūryakuṇḍa, Bhavakarani and Puṇyaśaravanam.

What was then the region like whose river and lake systems we noticed above. For our present purpose let me divide the whole region into parts, the region that lay on the north of the Tirupati hills which went then by the name of the Daṇḍaka forest, and the region between the Tirupati hills and the southern sea. This was the Tamiḷagam which the Sanskritists called the Drāviḍa country. Practically the major portion of the table-land was a forest tract with few inhabited regions. This Daṇḍaka forest, which name it assumed after its conquest by king Daṇḍaka, a predecessor of Rāma of Ayodhyā, extended to 500 yojanas towards the south commencing with the Vindhyas. (III. 12. 57). There were minor forest regions. These were the Nīla between the river Mahājava and the Pañcāpsaras lake, the forest of the Madhūkas, the Pañcavaṭi forest, and the Krauñcālaya. These forests were connected one with another by means of well known forest tracts through which there was frequent intercourse. For,

as we already said, there were inhabited spots here and there. These forests contained different species of trees, some of enormous height. Some of these are Sāla, Tāla, Punnāga, Kakubha, Vañjula, Dhava, Campaka, Nāga, Karṇikāra, etc., (Rāma. IV. 50 25-26). It was not all wild growth, if there be any grain of historical truth in the legend of Agastya, who is said to have discovered South India, as Columbus America, and brought about a cleansing in these impenetrable forests by cutting down trees and introducing agriculture. (III. 12-57). To-day besides natural forests we are familiar with plantations, for instance Eucalyptus on the Nilgiris from Australia. In that way we have the evidence of the Rāmāyaṇa to show that this North Indian introduced new plantations. It is said that trees and plants native to the Himālayas were planted. In order to ensure their successful growth he opened new river courses, lakes and irrigation tanks. Thus the combination of agriculture and forestry was an important development that goes back to the hoary past.

Who were then the inhabitants of these forests? These tracts were full of caves and bushes where lived ferocious animals and poisonous insects. There were lions, tigers, bears, buffaloes, deer, birds and monkeys (Ibid. Chap. 48). Turning our attention to human geography, generally speaking, the plateau regions, which are not easily accessible, were thinly peopled. For, it is only the jungle tribes that can make these regions their home. We hear of a number of tribes in these forests—the Rākshāsas, Vānaras, Madhūkas, Yakshas and others leading a semi-savage and a semi-civilized life. These killed the wild animals and ate their meat. Their skin and hides served as clothing as also the barks of trees. They also partook of the roots and fruits of the trees around them. These forest tribes (vanagocaras and vanacaraṣ) carved out kingdoms for themselves. One such was the Rākshasa kingdom of Janasthāna which was perhaps on the banks of the Godāvarī, a frontier post of the ruler of Lankā during the days of the epic Rāmāyaṇa. There was again the kingdom of Kishkinda of the Vānaras who seemed to have led a more civilized life. This is to be located close to Hampi of Vijayanagar fame in the modern Bellary district.

There was one more city Vaijayanta the capital of the famous Asura Śambara. It is not possible to identify this place of once a very considerable importance. For the story goes that Daśaratha, the father of Rāma conquered this South Indian king and was aided in this by his qaeen Kaikeyī. (II. 9. 12-15).

Side by side with these jungle tribes lived sages and seers performing penance and leading a life of detachment and resignation. They lived in hermitages and adapted themselves to forest life, clad in skin living on forest products. Some of these should have been the followers of Agastya, and some of the imperial rulers like Daṇḍaka and Daśaratha. Thus we see that the inhabitants were on the lower levels of culture.

South of this plateau lay the Drāviḍadeśa. Mention has already been made of its river systems. The early beginnings of civilization lay in the river valleys of the ancient world. The Nile, the Euphrates and Tigris, the Indus Valleys were the centres of ancient culture. In the same way the river beds of the Kaveri and Tāmraparṇi were the centres of a very ancient culture which we can term the Tamil culture. The Drāviḍadeśa was mainly a plain country full of fertile agricultural areas. Man felt no necessity for wandering in search of food and shelter. He had his abode. He found the time and energy to cultivate the higher arts of civilization. Here and there were hills and forests. Vālmīki mentions Velāvana which perhaps enclosed the insignificant hill of Vaḷavanāḍ at a distance of thirteen miles to the east of Tinnevelly. There were forests with drifting sands on the route that lay between the ancient Coḷa and Pāṇḍyan kingdoms, noted for jack fruits, bamboo trees and other wild shrubs. It was so hot in summer in these regions that walking during the day was impossible. Hence according to the Śilapadikāram, Kovalan and Kaṇṇaki performed travelling by night. Among the hills the Āṇamalais find frequent mention in Tamil literature as the Podiyal. Tamil literary tradition connects the sage Agastya with this hill. The Nilgiris and the Tirupati hills were also well-known. In fact Tamil literature speaks of the latter as the northern limit of the ancient Draviḍian country. The Rāmāyaṇa mentions a hill Dardura, and it is possibly the Nilgiris with the higest peak Doddabetta (Pargiter: JRAS 1894 p. 263). Rice was the chief crop raised in these regions though maize, ragi and millet were not unknown. The soil was suited to rice growing as it required plenty of heat and plenty of water. The people were addicted to liquor, chiefly of the palmyra. Meat was used not as the principal food as in the plateau but as supplementing the staple food which was rice or ragi. Milk and milk products were freely taken. The people wore rich attire made chiefly of cotton fabrics, since the black soil area was suitable to the growth of cotton. Iron was found in plenty as also precious metals. These were utilised in the making of jewels, utensils and implements. In the hills

lived the Maravar and in the pasture tracts the cowherds and shepherds with their simple and unsophisticated lives. They raised cattle and sheep and supplied milk and milk-products to the adjacent towns and villages. They used woollen clothing.

Let me now say a word about the Dravidian kingdoms and some of the towns mentioned as flourishing in pre-historic South India, though it has no direct bearing on the subject on hand. The countries of the Andhras, Puṇḍras, Coḷas, Keralas, and Pāṇḍyas are mentioned in the Kishkinda Kāṇḍa of the Rāmāyaṇa. The Mahābhārata and the Purāṇas corroborate the statement of the Rāmāyaṇa. But it must be noted that the Andhras were not regarded as Dravidas. We have the mention of an Andhrapatha and Andhradesa as distinct from the Tamil country. But we have little or no information about the prehistoric Andhra country except a stray reference in the *Aitareya Brāhmaṇa* or the *Baudhāyana Dharmaṣūtra*. It is difficult to locate the territory of the Puṇḍras. But there is no doubt as to the ancientness of the three Tamil kingdoms which went by the single connotation Dravida. We have to look for the Pāṇḍyan Kavāṭapuram in Korkai of the Tamil Literature reputed as the *quondam* capital of the ancient Pāṇḍyan kingdom. If we are to believe the Epics there was frequent intercourse between northern India and south from the time of Daśaratha or even earlier to that of Yudhiṣṭhira, the Pāṇḍava prince. According to the tradition as embedded in Tamil literature Korkai was swallowed by the erosion of the sea waters. It was noted for pearls and conches. These Tamil districts had trade and diplomatic connections with Laṇkā, now the island of Ceylon, even then separated by sea. If the evidence of the Brahmāṇḍa Purāṇa can be pressed, then there was Kañchi sacred to the goddess Kāmākshi and it was visited by Daśaratha to get rid of his sins and to be blessed with sons and daughters. Evidently the town of Kānchi belonged to antiquity and continued to maintain its prestige as a great educational centre to the medieval period of Indian history.

We shall now proceed to examine the coastal strips between the Ghats and the sea. The west coast region lay between the Western Ghats and the Arabian sea marked by sand dunes and flat alluvial land. In the southwestern corner lay the Malaya hills which can be identified with Travancore hills beyond and on the southern side lay the Mahendra hills penetrating well up to the sea. Hanumān is said to have crossed the ocean to Lanka from this hill. (Kishkinda Ch. 67). There was then the Kumari river

which became submerged but its name was retained and long before the Christian era the Cape Comorin became an important centre of pilgrimage. India then as now possessed a short coast line, and had few natural harbours. The periplus of the Erythrean sea mentions a few harbours like Mousiris (Musiri) and Supara (Goa). Turning our attention to the east coast it was shallow and did not permit of the formation of any natural harbour. This explains why there was intercourse between South India and the Persian gulf and the Indus valley from prehistoric times. The large use of conches among the finds of Mohenja Daro points out to a close connection, for conches were found largely on the south Indian coasts in those days and were exported. The coastal people who were originally fishermen and pearl divers became a seafaring people and by contact with the institutions of alien cultures developed a culture of their own. With a heavy rainfall the west coast became rich in evergreen forests and produced spices which were demanded by the ancient civilised world. It may be surmised that the western coastal region was more densely cultivated and more thickly peopled than the east coast. Living on coastal regions fish formed a principal article of diet to these people in littoral tracts. These people had again the opportunity to cultivate the sea habit and became sailors. This explains early trade connections between South India and Africa and the Mediterranean regions.

To recapitulate: Latest researches in Anthropology show that race and environment are two possible positive factors which are the cause of the genesis of civilization. Race denotes "some distinction of innate qualities in any genus or species or other class or group of living creatures." The modern concept of race in which the genesis of civilization has occurred has been found wanting. So also the environment theory by itself cannot be the sole cause of genesis of civilization. According to Toynbee: "The race theory finds its differential natural cause in the diversity of human physique, the environment theory finds it in the diversity of the climatic, topographical and hydrographical conditions in which different human societies live. But this discrepancy between the two theories is not fundamental. They are merely two different attempts to find a solution for the same equation by assigning different values to the same unknown quantity. The structure of the equation which is postulated in the two theories is identical, and neither can stand if the common underlying formula will not bear examina-

tion. The essence of the formula is a correlation between two sets of variations."

Under this test the race theory breaks down and the environment theory fares no better. (A Study of Hist. p. 253 Vol. 1. 1934,, Oxford). Our examination of the Geography of ancient Dekhan shows that both factors were at work and have contributed to the developments of a rich and great culture, which we call to-day Tamil culture.

The Noyyal Basin *

A Topographical Survey.

By

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The river Noyyal is a tributary to the Kaveri (Cauvery). It rises in the Western Ghats and flowing along the centre of Coimbatore District, joins the river Kaveri near the Noyyal station on the branch line of the South Indian Railway between Erode and Trichinopoly. It cuts the district into two equal portions from the West to the East. There are two other big tributaries in the distritc all flowing from west to east making the district into three river valleys. The northern one is the Bhavani while the southern one is the Amaravathi. When compared with the other two rivers, Noyyal cannot claim to be called a river at all. The frequent freshes and the long intervals of scarcity of water will induce one to call it a jungle stream. But the immense utility of its waters to the land holder, makes one to call it a life-long and life-giving river, to synchronise with the local tradition which gives it the guady name of Jeeva Nadi (ஜீவநதி). The empty sands in the eastern half of its course will give a lie to that boastful name while the western half certainly gives a true import to it.

The origin of the name Noyyal is unknown. Perhaps it is a mere proper name without any significance. But there are some pedantic scholars who derive the name from நோயில் meaning "sickless" or 'non-sickly'. Its waters being pure, never bring illness to anybody who drinks it. The name is also derived as follows:—(நொய்மை) noymoy = smallness + (அல்) Al darkness.—from its small moss-covered dark nature. Al (அல்) is also a suffix in Tamil being தொழிற்பெயர் விகுதி Hence the name would mean a small river. There is a classical name to the river viz., Kānchimānathi mentioned in the ancient Tamil classics and inscriptions. The Saint Sundarar has sung

> " மீ கொங்கில் அணி காஞ்சி வாய்ப்
> பேரூர் பெருமானை " in Koil Tiruppadigam.

Sekhilar in his Periya Puranam also says " அக் கொங்கில் காஞ்சி வாய்ப் பேரூர் குறுகினார்" in Eyarkon Kalikkamar Puranam. s. 88.

* An address delivered before the Coimbatore branch of the Association.

A copper plate of the Madras museum of the 9th century also says:—

“ காஞ்சிவாய்ப் பேரூர்புக்குத் திருமாலுக்கமர்ந்துறையக்
குன்றமன்னதோர் கோயிலாக்கியும் ”

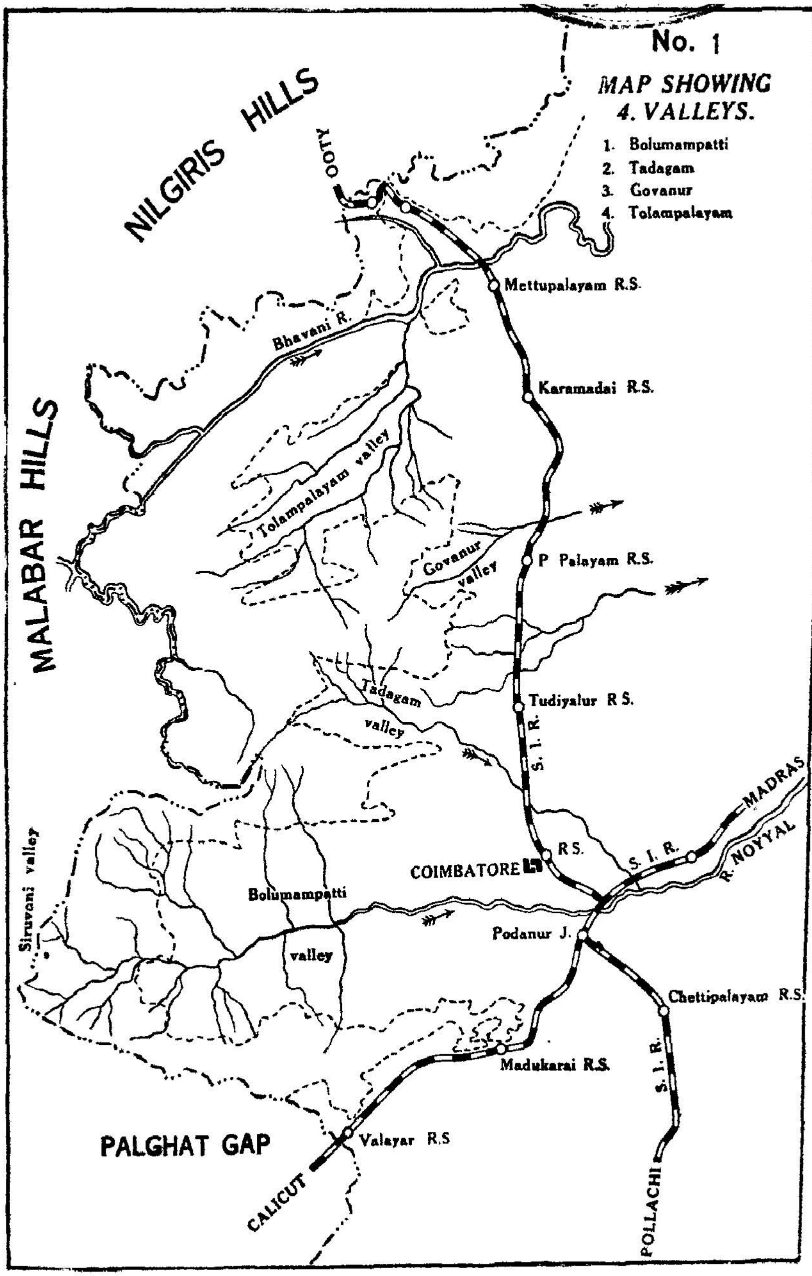
Hence it is clear that its classical name is supported by ancient authorities.

The three river systems above mentioned make two watersheds in the district which furnish a number of small streams to join the rivers on both sides. The Noyyal has its own tributaries throughout its length. Receiving all the natural springs and rain water from both its sides it carries them to and drains them into the Kaveri. It flows through the taluks of Coimbatore and Palladam and then forms the boundary between Erode and Dharapuram taluks. Hence the river system can be dealt with into three main basins or divisions. The first portion, flowing within Coimbatore taluk, is the most fertile and the best utilised. The second or central portion, flowing through Palladam taluk, is one of ordinary use and utility. The last portion which forms a boundary between Erode and Dharapuram is one of dry bed and is of no use to the people of the locality. The total length of the river is about 108 miles.

The first portion which lies in the Coimbatore taluk is the important one and hence a detailed description of it will be given. The country through which it flows is a valley and is known as Boluvampatti valley. It has the shape of a horse-shoe and its physical features are picturesque to look at.

The Western Ghats which form the boundary of the Coimbatore district has a number of valleys opening towards the plains formed by spurs of mountains running from west to east. Between the Palghat gap and the Nilgiris, there are four such beautiful valleys, as seen from the sketch herewith given. (Map. No. 1.)

The Southernmost is the biggest and the most fertile one. It is known as Boluvampatti Noyyal valley. The next north of it is known as Thadagam valley. For want of thick forests the valley is bereft of any perennial stream. Further north of it is a small gulf-like valley of Govanur or Nayakkanpalayam with a small stream in it. Further north of it lies the Tholampalayam valley through which the bigger river Bhavani and its tributaries flow. Of these four valleys, Boluvampatti valley is the one with which we are now concerned. This valley is about 15


No. 1
MAP SHOWING
4. VALLEYS.
1. Bolumampatti
2. Tadagam
3. Govanur
4. Tolampalayam
NILGIRIS HILLS
OOTY
MALABAR HILLS
Bhavani R.
Mettupalayam R.S.
Karamadai R.S.
Tolampalayam valley
Govanur valley
P Palayam R.S.
Tadagam valley
Tudiyalur R S.
S. I. R.
MADRAS
R. NOYYAL
S. I. R.
R.S.
COIMBATORE
Siruvani valley
Bolumampatti
valley
Podanur J.
Chettipalayam R.S.
Madukarai R.S.
S. I. R.
PALGHAT GAP
Valayar R.S
CALICUT
POLLACHI

miles long and 5 miles broad. It is bounded on the south by Boluvampatti Reserve Forest Block No. I, on the West by Block No. II and on the North by Boluvampatti Reserve Block No. III. Eastwards it is open towards the plains.

The 1st block contains the following hills and hill-peaks:—

1. Dharmalingam Hill. (2070 ft.):—a low grain-heap-like hill. There is a local tradition about it that a miser's heap of paddy was metamorphosed into stone by Providence.

2. Ettimadai Peak. (2555 ft.):—Another low hill.

3. Ayyasamimalai. (3609 ft.):—a semi-circular high hill with a temple on it where oracles are given by Pujaris. The temple is in the northern slope.

4. Orathimalai (3723 ft.):—with a fine spring coming down at its base.

5. Koothandimalai. (4115 ft.):—with a number of villages of hill-tribes on it.

6. Kutchimalai. (3450 ft.):—with fine springs.

The second block contains the following hills:—

1. Athimalai. (3681 ft.):—with small water courses.

2. Karimalai. (6550 ft.):—high range of hills with waterfalls and thick forests, with Kunjaramudi (5962 ft.) a peak in the range.

3. Porathimalai. (3458 ft.):—a low joint.

4. Vellingirimukkai. (3940 ft.):—a low joint course.

5. Vellingiriswamimalai (5912 ft.):—the temple is 5900 ft. and Andikalai spring 4986 ft. at its base; a place of pilgrimage and bathing ghat.

6. Thumbimudi. (4453 ft.):—a low continuation of the former.

7. Varadimalai. (4223 ft.):—similar continuation.

The various heights given above show a depression in the middle. Karimalai on the south is more than 6000 ft. while Vellingiri on the north is equally so; but the ridge connecting the two, which is Porathimalai, is only 3458 ft. Hence this portion is

known as Porathi Saddle, as the physical features look like a horse's saddle. On the northern side of this ridge lies the Siruvani valley with an immense water-fall which is of little use to the eastern Boluvampatti valley. The long pending scheme of utilising the Siruvani waters to the Boluvampatti valley has been recently fructified by the boring of a tunnel through the ridge to get water-supply to the town of Coimbatore at a cost of 42 lakhs of rupees. (the revised estimate being 48.17 lakhs.)

The third block has the following hills in it:—

1. Indinjamalai (3176 ft.):—A low and long range.

2. Perumalmudi with its spurs, an imposing hill North-east of Coimbatore.

3. Maruthamalai (2,500 ft.) with a beautiful temple on its eastern slope, a popular resort for the local inhabitants.

Boluvampatti valley with the above-said high walls of mountains has a very low rainfall owing to the scarcity of thick forests on its hills. While Siruvani valley has an average rainfall of 250" per year, Boluvampatti valley has only an average fall of 22-55".* But the whole rain-water falling on the steep slopes flow down into the valley through a number of streams which finally make up the river Noyyal. The scenery given by the number of rivulets on the three sides of the valley gives a vivid fascinating picture to the onlooker. The few water-falls with their silvery lines attract the eyes of a traveller, as he nears the western portions of the valley.

The tributaries of the river Noyyal which go to its formation are many and are as follows:—

1. *The Periyar*:—This is the chief stream of the river Noyyal. Hence it is called Periyar. It rises from the Karimalai and Kunjarmudi slopes and flows north-eastwards to the centre of the valley.

Average rainfall between the years 1870-89:—Coimbatore District, 25·65 inches; Coimbatore Taluk, 21·73 inches.

Average rainfall between the years 1870-1925:—Coimbatore District, 26·78 inches; Coimbatore Taluk, 21·88 inches.

Average rainfall between the years 1870-1930:—Coimbatore District, 27 inches; including Anamalai, 32·87 inches; Coimbatore Taluk, 22·55 inches.

Average rainfall between the years 1870-89:—Malabar, 114·51 inches; Salem, 31·46 inches.

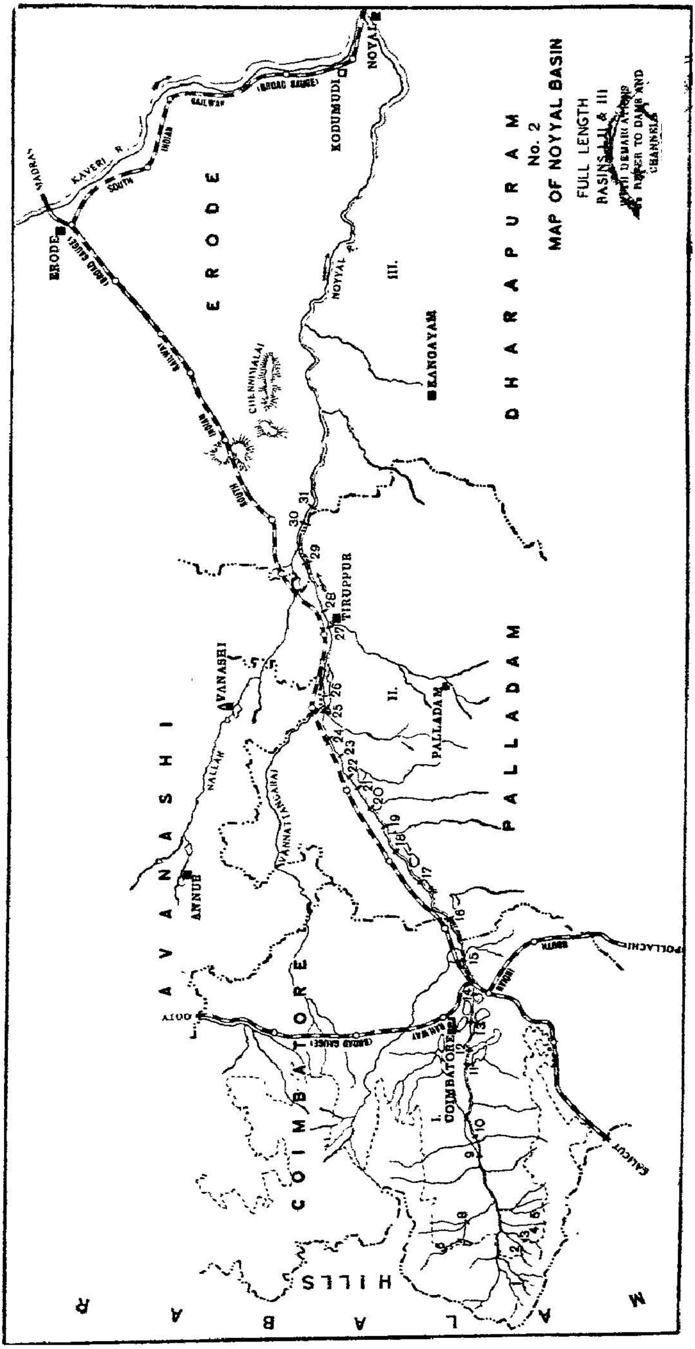
At the place where it is crossed by the Siruvani road, a pumping engine had been located by the Coimbatore Municipality for some years to get water to the main pipe line before the tunnel was completed.

2. *The Chinnar:*—This arises from the eastern portions of Karimalai peaks. There is a fine water-fall just above the plains in a deep cleft formed inside a huge rock. Inside the cleft, in a cave there is a temple of Sadiamman. Hence the surrounding ground is called Sadivayal. The Chinnar is joined by two streams one called Koduvayppallam (so called owing to its shape like a big hook) and the other Nandankaraipallam. At the place where Siruvani road crosses this river, a fine camping ground has been formed where every year the students of the Madras Forest College camp for a certain period in the year. There is an Irula village nearby, called Sadivayal. Forest department has collected and grown specimens of all forest-trees in this locality for the sake of Forest College students. Students of Forest Botany can find them to be a fine collection for their practical study.

3. *The Iruttupallam:*—This rises further east in the range of hills and it flows into the main stream near Iruttupallam forest bungalow. This place is the limit for human habitation, as further west is not free from Malaria.

4. *The Samimudiyar:*—This rises from the southern slopes of Vellingiri hills coming from the Samimudi or Vellingiri peak. The Andikalai stream joins it in the midway. Pilgrims to the Vellingiri hills used to bathe in the cool and pure waters of Andikalai at a height of 4900 ft. before going to the temple to worship the Panchalingam in the cave at Vellingiri peak. The temple cave is at the summit and the towering rock looks like a big toad from a distance.

5. *The Anaiyar:*—Rises from eastern slopes of Porathi saddle and joins the main stream a few miles east of the base. The water stored by the dam at Siruvani flows through a tunnel of about 5000 ft. into the Porathi river and is stored up into the settling tanks at the base of the Porathi hill. Huge reservoirs are constructed at this place by the municipal council to store up the water. A fine bridle path has been constructed from the base of the hill up the Porathi saddle up to the dam on the other side of the hill in the Siruvani valley. This bridle path is about 3½ miles in length and runs through shady evergreen jungles and makes a very pleasant walk.


MAP OF NOYYAL BASIN
No. 2
FULL LENGTH
BASINS I, II & III
ERODE
KODUMUDI
NOYAL
KAVERI R.
MADRAS
NOYYAL R.
III.
KANGAYAM
CHENNIMALAI
DHARAPURAM
TIRUPPUR
AVANASHI
II.
PALLADAM
ANNUR
NALLAR
VANNATTANGARAI
I.
COIMBATORE
OOTY
POLLACHI
CALICUT
HILLS
MALABAR

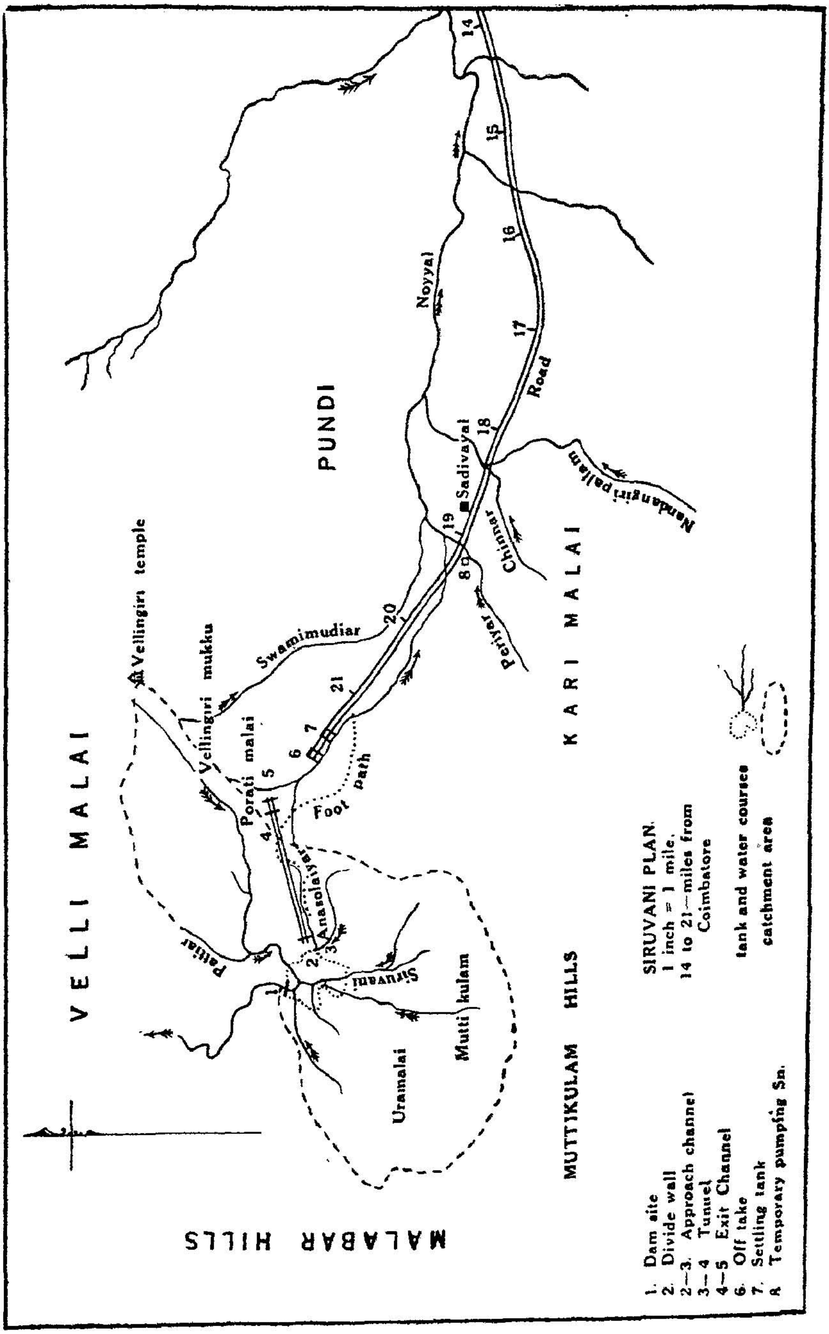
6. *The Pundiyar*:—This rises from a spring at the bottom of Vellingiri peak. The place is called Pundi and it is a favourite resort for pilgrims and picnic parties. There is a temple with a few Chattrams or rest houses at the place. The pilgrims to Vellingiri peak used to stay for a day at this place, before going up and after coming down, on their pilgrimage to the top temple. Traditionally one has to climb up seven hills before reaching the top temple. The pathway is rugged and difficult to climb up; but fine springs on the way relieve the tedium of the journey. Thousands of pilgrims climb up the hills during the months of April and May.

7. *The Kanchimanathi*:—This is a tributary which rises from the southern slopes of the Vellingiri Hills and flows by Nageswaram temple, about a mile from Semmedu. The inscriptions of this temple prove its antiquity and show that the place had been brought under cultivation more than 1000 years ago. The name of this stream seems to have been subsequently adopted and given to the main river Noyyal itself.

8. *Neelivaikal*:—There is a fine water-fall before this river reaches the plains.

Besides the above-said streams there are a number of mountain torrents on both sides of the main stream, which take up rain water from the high slopes down to it. Orathi and Ayyasamimalai pallams of the south, Anaippallam or Pambadi Pallam from Marudamalai and the Sanganurpallam from the Thadagam valley on the north, are some such streams.

The Noyyal river which gets waters from the above-said streams flows in the centre of Boluvampatti valley and emerges to the open plains from Perur eastwards. Considerable use is obtained from its waters. The want of a steady flow of water was felt from ancient days. The poor retentive power of the eastern slopes is the reason for the capriciousness of the stream. The ancient cultivators were therefore forced to resort to the damming of the river-water wherever possible. As a result of it they had constructed 32 dams or anicuts to the river and now there remain 31 dams in use. The inhabitants of the valley used to pride themselves about their river having the largest number of anicuts than any other river in South India. Even in this district the bigger rivers of Bhavani and Amaravathi have only seven and eleven anicuts respectively. The thrifty people of this valley are precautious enough not to waste even a drop of water and have con-


VELLI MALAI
MALABAR HILLS
PUNDI
KARI MALAI
MUTTIKULAM HILLS
Vellingiri temple
Vellingiri mukku
Vellingiri
Porati malai
Swamimudiar
Noyyal
Road
Sadivayal
Nandangiri pallam
Chinnar
Periyar
Foot path
Anaolaiyar
Pattiar
Siruvani
Muttikulam
Uramalai
SIRUVANI PLAN.
1 inch = 1 mile.
14 to 21—miles from Coimbatore
tank and water courses
catchment area
1. Dam site
2. Divide wall
2—3. Approach channel
3—4 Tunnel
4—5 Exit Channel
6. Off take
7. Settling tank
8. Temporary pumping Sn.

served it by constructing anicuts and channels. The following is the list of anicuts and channels in the Boluvampatti valley :—

1.	Seethapathi	Channel.
2.	Koduvaipudi	,
3.	Mussurambu	,,
4.	Mudanthurai	,,
.5	Iruttupallam	,,
6.	Sundaram	,,
7.	Neeli	,,
8.	Pudikattu	,,
9.	Chitrachavadi	,
10.	Kuniyamuthur	,,
11.	Coimbatore	,,
12.	Kurichi	,,
13.	Vellalur	,,
14.	Singanellur	,,

From the channels formed as said above, irrigation tanks have been constructed and water is stored up in them for purposes of wet-cultivation. The following tanks are found in this valley:—

1. Semmedu tank from Neelivaickal.

2. Perur Sundakkamuthur tanks from Chitrachavadi west channel.

3. Vedapatti, Krishnambuthi, Narasambuthi, Selvambuthi, Seeranaickenpalayam, Kumarasami Eri and Pallapalayam tanks from Chitrachavadi East channel.

4. Big tank, Valankulam and Puliyakulam from Rajavaickal.

5. Kurichi tank through South channel.

6. Singanellur tank through its channel.

7. Vellalur tank through Sangalikaruppan channel.

The numerous channels and the abundant storage of water enable considerable amount of wet cultivation in this valley. In 1881 and 1882, 16,209 acres fetching Rs. 121,883 of kist were cultivated, whereas far bigger rivers of Bhavani and Amaravathi had only 26,826 and 25,114 acres under cultivation respectively. In order to better the supply of water and also to give steadiness to the supply, schemes have been suggested even from 1820. Mr. Wedderburn, a then popular Collector had suggested even in

1872, cutting the Porathi ridge and putting a dam of 250 ft. across the Siruvani to divert its waters into the Noyyal. The scheme did not fructify until recently when the Municipal Council got the water for town-supply only. The extra supply of water after satisfying the needs of the town drains into the Coimbatore tanks and is utilised for cultivation. The capricious nature of Noyyal was manifested in the damaging floods of 1879 and 1883. But in other years, nothing very serious happened and hence the river could be generally considered to be a harmless one even during floods.

The Chitrachavadi channel about 7 miles long is the most important channel branching from the Noyyal and irrigates about 4000 acres of land. There are a number of sluices to the channel through which water is branched off to the wet lands. The other channels have also sluices and many of them empty into tanks from which also water is taken by sluices. 6031 acres are irrigated by Government channels and 7097 by Government tanks. The main crop grown in the lands irrigated by the above said channels are Paddy, Plantain, Cocoanut and Arecanut. The fine cocoanut topes on both sides of the river from Boluvampatti till Irugur mark the course of the river to an onlooker. Round about Coimbatore town on its three sides big irrigation tanks exist from time immemorial and render the climate of the town temperate and cool for 6 months in the year. The picturesqueness of the town is partly due to the existence of the chain of tanks round about the town.

I have already mentioned that the city of Coimbatore gets its water supply from Siruvani. Porathi saddle is bored through by a tunnel in the live rock by about 6′ × 6′ to a length of 5000 ft. A dam has been constructed on the Siruvani very near Muthukulam forest bungalow. The catchment area though 7 square miles only, has a heavy rainfall. By the construction of the dam, an artificial lake has been formed which is very fine and zig-zag in appearance surrounded by beautiful green hills. Water is taken through the tunnel and then through Porathi river to the settling

* The assessment for Noyyal channels and tanks are as follows :—

		Single crop.	Double crop.
Coimbatore Taluk	Rs.	7 9 10	10 9 2
Palladam Taluk	„	6 13 11	9 9 0

tanks at the bottom of the hill. From the settling tank a protected steel pipe of 22" is taken all the way to the city reservoir north of the Forest College to a length of about 22 miles. The water is duly chlorinised and sent to the town by a system of steel pipes. The supply is estimated to be twenty gallons per head per day up to a population of one lakh. Siruvani water is said to be the second best in the world for purity, the first being Glasgow water in Scotland. Attempt at use of it for irrigation has not yet been made, but the surplus water goes to the tanks for the present.

Antiquities:—Boluvampatti valley is noted to be a very ancient tract in the Kongu Nadu. The whole country of Kongu has been divided into 24 nadus of which western Noyyal basin formed part of Arai Nadu. Boluvampatti valley itself had been known from ancient days as Perur Nadu which was a portion of Arai Nadu. From the inscriptions found from the ancient temples of Nageswaram, Perur and Vellalur, we can locate the limits of Perur Nadu as extending throughout Boluvampatti valley by about 25 miles by 5 miles. Relics of pre-historic age have been discovered in various parts. The Pandavar Kulis at Perur and Vellalur had been excavated and fine specimens of ancient pottery have been obtained from them and preserved in the Madras museum. Quite recently at a place known as Mandapakkadu near Kannampalayam, and at a place known as Rathamedu near Nanjundapuram a number of pre-historic relics have been found. About 50 years ago Roman coins were found at Vellalur and quite recently a find of 105 coins ranging from Tiberius to Nero were discovered in the same village. These relics go to prove the ancient character and the historicity of the place and how far civilised the people had been even 2000 years ago. The temples of Perur and Vellalur have inscriptions which are more than a 1000 years old and saints like Sundarar have immortalised Perur and other sacred shrines in their poems. Even Kerala invasions into the Kongu country have been preserved in the inscriptions and the modern town of Coimbatore had once got the name after a Kerala invader as Veerakerala Nallur. It is needless to dilate upon the historical incidents in this discourse. The Kanakasabhai built by Alagathiri Nayakan, a prince of the royal family of Madura Nayaks about 1600 A.D. attracts admirers from far and wide. The river Noyyal has been sanctifying this land of historical wealth from time immemorial.

Central Basin:—The central Basin of the Noyyal river is roughly the centre of Palladam taluk. It is bounded on the south

by the Ayyampalayam high ground which go up to 1400 ft. above sea-level and on the north by the Avanashi water-shed. The river flows along the railway line as far as Tirupur and then the two separate each other in different directions. The central basin has no hills and is noted for dry and forcible winds. The soil is poor and the utility from the river is limited. But yet as much use as possible has been obtained by the thrifty people of the locality by constructing dams and channels. The following are the anicuts found in this basin:—

1. Pallapalayam
2. Irugur
3. Sulur
4. Rasipalayam
5. Madapur
6. Samalapuram
7. Karumathampatti
8. Pallapalayam
9. Semmandampalayam
10. Agraharaputhur
11. Mangalam
12. Andipalayam
13. Tirupur
14. Mannarai
15. Mudalipalayam
16. Anaipalayam
17. Kattangani

About three big tanks are found in this area, Sulur, Samalpuram and Koolippalayam. Supply of water cannot be said to be regular in this area and hence wet cultivation is very poor. The river obtains additional water from a few tributaries.

1. Tirupur pallam is the one which joins the river at Tirupur. It is dry except on rainy days.

2. Vannathangarai is a long tributary which drains all the water from the black soil areas of Samakulam downwards.

3. Nallar is another big jungle stream which collects all the rain water from Annur eastwards. This river has been sanctified in the hymns of Sundarar and on its banks have arisen the sacred places of Avanashi, Thirumuruganpoondi and Kurakkuthali (Periyapalayam). Temples of these three places have been mentioned by Saint Sundarar who flourished in the 9th century A.D. I cannot pass on without mentioning the existence of an example of an ancient Hindu style of a bridge over the Nallar near the Avanashi temple. The only other specimen of a bridge of the Hindu Rajas is found at Sivasamudram over the river Kaveri a greater portion of which has been washed away recently by floods.

The tributaries in this basin, being very poor, very little use could be got from the river by the people.

Last Basin:—The final course of the river Noyyal lies between Erode and Bhavani taluks forming the boundary line be-will feel encouraged to use it.

tween them. The river even from Tirupur is dry throughout the year except in floods. Even the tributaries which are mere dry torrents add very little resource to the river. There being no water, no anicuts have been put up and no channels have been dug. Hence no reservoirs could be constructed. South of the river lies the Kangayam lands with poor soil. North is equally poor, jetted here and there by a few solitary hills as Chennimalai and Vijayamangalam peaks. This basin is bereft of even historical antiquities except the constant feuds between the stalwart Kongu Vellalas and the redoubtable Vettuva Kavundans which have been preserved in some old ballads and folk-lore. The river finally empties its vacant sands into the mother river Kaveri very near Kodumudi. Kodumudi, of course, is a place of historical interest having been visited by all the three Saiva Saints. Our river is of no use to the tracts round about Kodumudi.

General:—"Roughly speaking all the rivers of this district are rivers of South-West Monsoon and the irrigation therefore begins with that monsoon." So also is the Noyyal. If South-West Monsoon fails, water in the river fails and irrigation suffers. If forests which form the sources of water supply to the rivers and which retain moisture even long after the rains, are all conserved, steady water supply could be got for the river. But unfortunately this precaution had not been taken sufficiently early as seen from the quotation given below.

As stated already the Boluvampatti reserves forming the three forest blocks are the conservancy areas for the river. History and tradition both go to show that much of the Boluvampatti valley was thick forest years ago. The ancient name of Perur was Pippilaranyam, meaning forest of pipal trees. Similarly, the names of other places are found. But as civilisation grew and penetrated inside this valley, disafforestation began and cultivation was introduced. Hence retention of moisture diminished and the river became a mere jungle stream. The Coimbatore district Manual says about this river.

"The *Noyyal* irrigation is first class. This little river is more of the nature of a jungle stream, and has from time immemorial been noted for its capriciousness and the violence and the brief duration of its freshes; it has consequently been supplemented by tanks which it fills along its course; these are specially noticeable at Coimbatore town. In Palladam taluk a considerable area used to be fed by channels, which, when the river was not in freshes, were supplied though scantily, by spring channels,

i.e., excavations dug in the sand for miles above the channel bed and intercepting the underground current, which was then always available, as at this day in the river Vaigai of the Madura District. Of late years these spring channels have been found useless, the underground flow being but slight and short. This and the increased violence and fitfulness of the freshes are directly attributable to the denudation of the Boluvampatti forests at its source to supply the immense fuel and timber demand of Coimbatore and its neighbourhood. It is the loss of the underground current that has caused a large transfer in the recent settlement from wet to dry, and it is in this loss that the forest denudation has most shown its effects, a result which agrees equally with observation and inference. The conservation of the forests which yield a gradual supply to the more important Bhavani and Amaravathi rivers is a source of some anxiety; the forester here is more important than even the engineer."

The jungles and the slopes and the malarial plains abutting them are inhabited by the hill-tribes called Malasar or Irular. But for them neither the forest department nor the malarial tracts in Boluvampatti valley could get labour. They live without nourishment or education or other amenities of civilisation. Even if these are offered, they are reluctant to take to them. The diminution in the forest area has been detrimental to their property; and their villages and their census are going down day by day.Forests in the Coimbatore taluk form 131:354 sq. miles, and the number of acres are 84,066. A portion is administered by the Coimbatore forest department and another portion by Palghat department. Siruvani valley with better forest-produce and more rainfall goes to Palghat.

Conclusion:—In ancient days except the building of anicuts across rivers, digging channels for irrigation, erecting tanks to conserve water and raising temples of big dimensions, our forefathers did not resort to other engineering works. Communications were mostly through earthy roads and few bridges were constructed. In recent times broad roads have been laid and bridges have been found to be necessary. The River Noyyal has been spanned by road bridges at six places, namely, Semmedu, Perur, Coimbatore, Singanellur, Tirupur and Palayakottai. It is crossed by the railway by two railway bridges one at Podanur and the other at the Noyyal Railway station. Besides these bridges there are six cause-ways to facilitate traffic. In conclusion, it has to be pointed

out that the utility of a river is not always measured by its length but by its uses and it must be remembered with pride that the river Noyyal though of comparatively little magnitude with a small and unsteady water supply has been made immense use of and stands as an example of a river of maximum utility in contrast to other bigger and mightier rivers whose waters run to waste to the sea.

Museums as Aids to Geography Teaching

By

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Museums do not, as a rule, aim directly at much geographical teaching, except in the case of such as are specially devoted to the exposition of geography. For, if they were to adopt a geographical arrangement for their exhibits, the more fundamental relationships of the latter could not be given due prominence. But every object in every museum necessarily illustrates some fact of geography, and some of them usually illustrate facts of sufficient importance to be of use in geographical teaching, a point which I propose to illustrate with reference to the Madras Government Museum.

As the Madras Museum aims primarily at illustrating the many interesting features of Southern India, exhibits from other parts of the world are few in number. But the possession by Denmark of a settlement at Tranquebar, leased from the Nayaks of Tanjore in 1620 and sold to the British East India Company in 1845, led to the importation of cannon from Denmark, of which several bearing the cypher of King Christian VII are to be seen in the Arms Gallery, where, as a consequence of the capture of Manilla in 1762 by troops from South India, Spanish armour and a bronze relief of the Spanish coat of arms will also be found. China is represented by two immense bells in the entrance hall of the Old Building and by a Mandarin Duck exhibited with other birds of specially handsome plumage in the zoological section; and Burma is represented by a large teakwood carving in the gallery devoted to botanical economic products.

Several groups of particularly interesting animals are associated with particular geographical regions, and some of these are included in the Museum collections. Thus from Australia there are the two primitive egg-laying mammals, the Duck-Billed Platypus and Spiny Anteater, and the skeleton of a Kangaroo; from the Malay Peninsula comes the Malay Tapir, representing a genus now found only in that Peninsula and the neighbouring islands and in far distant Central and South America; from the forests of Borneo

and Sumatra there is the Orang-Utan; from tropical South America the gaudily coloured Macaw; and from the rivers of tropical Africa the skull of a Hippopotamus. The remarkable group of flightless birds, of which the Ostrich is the best known example, now found mainly in the southern hemisphere, is represented by a Cassowary from the island of Ceram and by eggs of the Emu which is confined to the Australian Region and of the Ostrich which is confined to Africa and Arabia.

Migratory birds are well known as amazingly extensive travellers and are represented by various Duck, Stork, Crane, Curlew, Snipe, etc. Many other birds perform seasonal migrations within the country of their birth, but comparatively little is yet definitely known about such local migrations in India. The beautiful Paradise Flycatcher may, however, be cited as an example. It is only found in Madras in the cold weather, migrating to cooler parts of the country in the heat.

Human intercourse between different countries is largely concerned with trade; and this is illustrated by porcelain made in China, some of it without human or animal figures and in some cases with inscriptions in Arabic character for use by Mohammedans, and some of it with the arms of the East India Company. There are also pieces of Worcester ware, made at the town of that name in England for the use of the East India Company, which also bear its arms.

From the ancient kingdom of Gandhara, on what is now the north-west frontier of India, come a series of Buddhist sculptures reminiscent of Greek work, a reminder of the temporary Greek domination of western Asia resulting from the invasion of Alexander the Great. They form an interesting and instructive contrast to the Buddhist sculptures from Amaravati on the banks of the Krishna river, exhibited in the same room, which are thoroughly Indian. The art of the Eastern Himalayas is represented by a collection of Nepalese and Tibetan metal work, shown for comparison with the collection of metal work from South India. The metal work from South India includes several types associated with particular localities such as Bidar in Hyderabad, Tanjore, Tirupati and Trichinopoly.

This brings us to the Madras Presidency, the various parts of which are much more fully represented than are other districts. The huts, jewelry, implements, etc., characteristic of several of the interesting primitive tribes inhabiting different parts of the

Presidency are shown in the anthropological gallery, the Khonds of the Agency Tracts, the Chenchus of Karnul, Nellore and Kistna, the Todas of the Nilgiris and the Kadars of the Anamalais being among the tribes thus illustrated.

Several types of manufactured articles characteristic of different districts are also shown. In addition to the special types of metal work already mentioned there are the boxes with heavy decorative brass hinges and brass lamps with closed receptacle characteristic of Malabar, ivory carving from Travancore, sandalwood carving and rosewood inlaid with ivory from Mysore, lacquer work from Karnul and sandalwood overlaid with ivory fretwork and tortoise-shell from Vizagapatam.

Specimens of the fossils, rocks and minerals of the Presidency are exhibited in the geological gallery with illustrations of some of their economic uses. These include fossils of Cretaceous age from Trichinopoly District, fossil corals of more recent origin from Rameswaram Island, mica from the Nellore District, gold from Kolar, etc. The plant associations of different areas serve as an index to much that is of interest to geography, especially climate, soil and the composition of the underlying rocks. Such associations should be illustrated in the part of the botanical gallery devoted to ecology; but at present the whole of this gallery is undergoing extensive revision, attention being concentrated on the systematic part, and I see no very immediate prospects of much being added to the few old and not very satisfactory photographs of which the ecological section now practically consists.

The archaeological galleries also at present illustrate geography much less effectively than they should. The Buddhist stupas for which the Kistna and Guntur Districts are famous are represented by magnificent series of sculptures; the temple architecture and sculpture characteristic of the Tamil country is well represented by a number of sculptures and explained by diagrams and photographs. But the images from the Tamil country are arranged together with those from other parts according to the deity or saint represented; and the other Hindu sculptures are arranged with equally little consideration of the differences characteristic of different parts of the Presidency. Plans have, however, recently been prepared for using the specimens already on exhibition so as to illustrate the differences between, for instance, the achitecture and sculpture of the Chalukyan and Hoysala kingdoms in the Kanarese country on the one hand, from those of the Pallava and Chola kingdoms in the Tamil country on the other. But these

plans can only be carried out after the completion of the new buildings now being begun.

What has been said is, I hope, enough to show that even a museum which, like the Madras Museum, is arranged on a basis that is not primarily geographical, is almost certain to contain a considerable amount of material from which help can be obtained for illustrating geography; and I hope that geography teachers will feel encouraged to use it.

Geography Scheme of Work in Forms I to III

(Issued by the Madras Educational Department.)

The aim of the following scheme of work is to give an adequate idea of the requirements considered essential, without restricting the school or the teacher too rigidly to any standardized method of planning the detailed syllabuses. In planning its geography teaching syllabuses each school must select the treatment and material which is best suited to its own particular needs and resources, and in particular to the district in which the school is situated. The scheme merely outlines the general principles which must be borne in mind.

I. The whole world should be studied in the three years. All the continents should be taken in turn and studied regionally. The treatment should be largely descriptive at the beginning and become progressively less so as the course proceeds; it should aim at bringing out the influence of geographical environment upon human activities. Physical, human and political geography should be taken in combination so as to present a synthetic picture of a human society in any area. *Under no circumstances should these aspects be considered separately.* Constant reference to local conditions and examples is most important; the home region should be the standard of comparison throughout.

2. Emphasis should be laid on developing a broad general knowledge of world topography including the main physical and political features.

3. The following geographical principles should be treated in an elementary way each in relation with some region of which it is a characteristic :—

Formation of fold mountains, block mountains and rift valleys; volcanoes; the Pacific "Girdle of Fire"; earthquakes; the work of rivers as illustrated on a large scale by characteristic types, *e.g.*, Ganges and Colorado, and as seen by actual observation of the local streams; underground water and ordinary wells and artesian bores; avalanche, glacier and iceberg; formation of soil. Simple climatic studies, the effect of elevation and latitude upon temperature, why rain falls, how winds bring rain, trade winds and mon-

soon winds, the effect of the sun's altitude upon temperature, the seasons in temperate lands and tropical lands, the effect of temperature and rainfall on vegetation and the resemblance between the sequence of zones of vegetation found from the Equator to the Poles and that found on the slopes of mountains, leading up to the study of simple temperature and rainfall distribution over a continent.

4. The following geographical concepts should be gradually developed in the mind of the pupil in the course of the regional study :—

(a) A clear picture of the work and environment as found in a characteristic region of the following workers : hunters and trappers ; lumber men ; deep-sea fishermen ; farmers ; including the wheat-farmer, rice-farmer, millet-farmer, dairy-farmer, fruit-farmer, sheep-farmer ; factory worker.

(b) A clear picture of life and environment as found in the following regions; a desert region, an oasis, a tropical forested country, a mountainous region.

(c) Clear ideas of typical products grown in different climatic regions—what they are like, why they are important, why grown in particular regions.

(d) Sound elementary ideas such as the following : how coal is used ; the use of waterfalls to industry ; how metals are produced ; important uses of iron and wood ; why and how men exchange goods ; ways in which people and goods are transported; the dependence of factories upon communications and population; the purpose of locks in ship canals ; characteristic ways of irrigating lands ; how man has reclaimed land from the sea ; geographical factors that have helped settlements to develop.

5. *Map Reading.*—It is assumed that the making of simple plans has already been done by the pupils in lower classes. The pupils should be gradually introduced to the idea of the contour line in the representation of relief, of simple climatic maps (temperature, wind and rainfall) and of vegetation and population maps. They should also be given practice in the making of sketch maps from given data. Attention should also be drawn to the value of lines of latitude and longitude as a means of indicating world position and of calculating distances. Finally opportunities must be provided for the simultaneous study of the large scale map and the country represented.

6. *Sun and Weather Observations.*—The following daily observations should be taken, for a season at least, and the records plotted in graphic form (on a large scale if necessary), maximum and minimum temperatures and rainfall and direction of winds. These observations should be not only taken and recorded but should be related to the teaching. The altitude of the sun should be taken by means of shadows once a month, the relationship between sun altitude and the seasons emphasized, and the dates of the overhead sun to be observed.

7. *Globe Studies.*—Exercises based on the slate globe to demonstrate how the spinning earth is the cause of night, the movement of shadows cast by a pin on a rotating globe, and their resemblance to the shadows cast by the shadow pole in the playground; the effect upon length of day and night when the spinning globe is moved round the source of light; how places are located on the globe with reference to the Equator and Prime Meridian.

8. *Regional Geography.*—There are several ways in which the world may be covered during the three years. The following are suggested as alternative treatments:—

(*a*) Form I.—India and the Three Southern Continents.
Form II.—North America and Asia.
Form III.—Europe with a fuller treatment of the British Isles than of other countries of Europe.

(*b*) Form I.—The New World.
Form II.—The Old World with emphasis on India.
Form III.—Regions of the World.

(*c*) Form I.—The Indian Ocean Basin (India, Australia and Africa).
Form II.—North and South America.
Form III.—Eurasia.

9. The following syllabus has been drawn up as a type course based upon the principles enumerated above. It is to be considered as only *one* suggested method of framing syllabus, and not as a standardized syllabus.

Geography Syllabus for Forms I to III

Note 1.—Map-drawing exercises should be set at least every second week in connection with the regional topics, in the first term in Form I, in class under the teacher's supervision and subsequently as home-work. These exercises will be of different types such as (a) inserting in traced outline maps facts learned in the lesson, (b) drawing simple sketch maps to express facts learned, (c) copying (occasionally) sketch maps found in the text-book.

Note 2.—Each regional topic shall be treated descriptively, should deal (but not exhaustively) with features of relief and vegetation, productions and important settlements, and emphasis should be placed on the features specified below in connection with each topic.

FORM I.

OBSERVATIONAL AND LOCAL

7 Lessons.

1. The weather; why rain falls; how rainfall is measured; preparation of a rain chart for recording daily rainfall (for at least one term and in the rainy season), by means of a simple home-made rain gauge.
2. Wind direction, preparation of a wind rose followed by wind observations for a period in each of the two wind seasons.
3. Varying length of day in the locality and change in position and time of sunrise and sunset through the year.
4. The making of a simple plan introducing the idea of scale.
5. The work of rain and streams in wearing away the surface as seen in the locality.
6. How rocks are made—examination of typical rocks in the locality.
7. Crops and soils—How soils are made; sand, clay and visit to see characteristic soils of the locality and the crops grown on them.

PENINSULAR INDIA

18 Lessons.

1. Western Ghats and how they were made; the growers of tea and coffee.
2. Life and occupation on the West Coast (Travancore, Cochin and Malabar and Palghat).
3. The Madura Plains and how men bring water to parched lands (2 lessons).
4. The Cauvery river. Life on the delta and on the plateau (2 lessons)
5. The Carnatic country and the dry crop farmers.
6. Madras and its harbour.
7. The Tungabhadra and the cotton growers and manganese miners.
8. The Northern Circars and the delta lands.
9. The districts of the Madras Presidency, and their capitals; the railways of Madras, Travancore and Mysore; Madras to Bombay, Calcutta, Colombo and Delhi (2 lessons).

THE WORLD

25 Lessons

AFRICA

1. **Introducing Africa.** Barbary States, Mediterranean lands.
2. The desert and the camel men.
3. Egypt and the Nile.
4. Negro farmers and cattlemen of West Africa.
5. People of the Congo.
6. Eastern plateau and its rift valley and wild animals.
7. South Africa; waterfall and gorge (2 lessons).

AUSTRALIA

8. **Introducing Australia.**
9. Australian shepherds and cattlemen (underground water, artesian well), Savannah lands.
10. Australian planters.
11. Australian workers in mines and factories; minerals.
12. New Zealand and the Maoris. Volcanic plateau and thermic regions (2 lessons).
13. Islands of the Pacific.

SOUTH AMERICA

14. **Introducing South America.** Comparison with Africa and Australia.
15. Selvas of the Amazon.
16. Cattlemen of the Ilanos. Town dwellers on the plateau.
17. The Guianas and Trinidad.
18. Lands of the High Andes.
19. Planters of Brazil.
20. The Plate river lowlands (pampas).
21. Chile and its people—desert and Mediterranean lands (2 lessons).

Text-book, etc.—1. Columbus Regional Geographies, Senior Book I, pubblished by University of London Press. 2. Geography of the Madras Presidency—Morrison, published by Macmillan & Co.

FORM II.

OBSERVATIONAL AND LOCAL

8 Lessons.

1. How temperature is measured; preparation for recording the maximum and minimum temperature for one term. Finding the mean daily temperature from the readings.

2 and 3. The path of the sun in the sky through the year.

(a) Monthly measurement of the sun altitudes through the year.

(b) Cycle of the hot and cold seasons.

4 and 5. Study of a simple contoured model showing a hill with steep and gentle slopes and comparison of model and its contour plan.

6 and 7. Study of the local river or stream as an agent of denudation and deposition.

8. Study of the taluk map.

INDIA

18 Lessons

1. Location on the globe by means of latitude and longitude. The Meridian of 90 E and the Tropic of Cancer in relation to India.

2 and 3. Temperature in India:

(a) Finding the mean monthly temperature from class records and the mean annual temperature.

(b) Effect of altitude, a comparison of graphs of a hill station and of a town near its base; location of hill stations.

(c) Effect of the sea and a comparison of graphs of Akyab and Nagpur.

4. Water-vapour in the air and its precipitation as rain, dew and fog. Effect of monsoon rainfall on temperature.
5. Life and work in the Rajputana desert.
6. The Himalayas; how they were formed; the chief ranges and peaks, the passes and their traffic.
7. Snow, frost and ice; Glaciers and their work, the Gangotri Glacier and the source of the Ganges.
8. The Frontier State and its mountain people.
9. Life in the Punjab plains; the Salt Range.
10. The Happy Valley of Kashmir; a dried-up lake-bed and the land of fruit-growers.
11. The Indus River and its control by man; its ancient covilization.
12. Kathiawar and Cutch. The work of the sea.
13. The cotton lands of Bombay and Bombay City.
14. The Ganges River, rabi and kharif, rice, sugar and jute.
15. Assam and East Bengal. A land of forest and flood.
16. The coal-fields of Bengal; and Calcutta.
17. The Coral Isles of Indian seas and Ceylon.
18. Madras to Burma and the change in time. Rangoon, Mandalay and the Irrawaddy.

THE WORLD

26 Lessons

North America and Asia

NORTH AMERICA

(14 Lessons.)

1. The Canadian hunters and fishers of the Arctic Shorelands.
2. Canadian trappers and lumber jacks.
3. Canadian wheat lands.
4. Canadian dairy farms.
5. Canadian and Newfoundland fisheries.
6. Canadian mines and factories.
7. By train across Canada.
8. United States of America; the Pacific States.
9. Western Cordillera.

10. The Missisippi Basin.
11. The fall-line States.
12. The busiest part of the United States of America.
13. Lands of the Spanish Main.
14. By Air Mail across the United States.

ASIA

(12 Lessons.)

15. Monsoon lands.
16. Equatorial Islands.
17. Indian farmers; Burmese teak and rice.
18. China and the Chinese.
19. Regions of China—North China, Central China, South China.
20. Japan and the Japanese.
21. The mountain heart of Asia.

22 and 23. The land of the five seas and Afghanistan.

24. Siberia and the Trans-Siberian Railway.
25. Asia—Relief.
26. Asia. Climate and major natural regions.

Text-books, etc.—Columbus Regional Geographies, Book II—University of London Press.

FORM III.

OBSERVATIONAL AND LOCAL

10 Lessons.

1. Longitude and time.
2. The sun's noon elevation at different places on the earth and the revolution of the earth.
3. Winds—the effect of sea and land, mountain and plain on local winds.
4. Study of any particular physical feature of interest in the locality, e.g., coast erosion, effects of weathering, etc.
5. Contours—how to draw a simple section.

6, 7, 8 and 9. Economic studies in the locality including visits to learn about at least two of the (a) local town industries or (b) local farming industries.

10. Means of communication in the district and a study of the district map.

INDIA

14 lessons.

Commodities of India; the geographical factors underlying their production; processes involved; their location.

1. and 2. Cereals, wheat, rice and millets (2 lessons).

3. Sugar, jute and groundnuts.
4. Tea, coffee and cardamoms.
5. Cotton and cottons.
6. Coal.
7. Iron and steel.

8. Other minerals—manganese, gold, mica.
9. Timber products.
10. Hides, skins and leather.
11. Relief and railway communications of India. Modes of Transport in India, when and why each is used.
12. Relief and railway traffic of India.
13. Road transport in India and transfrontier routes.
14. Water transport in India—river, canal and sea coast.

World (Europe and British Isles).

28 lessons.

1. Europe—the Peninsula of Peninsulas. Highlands and lowlands. Folded mountains and block mountains.
2. The climates of Europe. Temperatures, winds and rainfall. Seasonal rainfall and natural vegetation.
3. The regions and countries of Europe.
4. Scandinavia—Norway and Norwegians. Sweden and Swedes. Denmark and the Danes.
5. The Netherlands and Belgium.
6. France and the French.
7. Germany and the Germans.
8. The Alps. Switzerland and the Swiss.
9. The Rhine.
10. The Danube—An international water-way.
11. The Danubian States—Austria, Hungary and Rumania.
12. Czechoslovakia—the land of the Czechs and Slovaks.
13. Poland and the Baltic States.
14. Russian lands in Europe.
15. Mediterranean lands. Spain and Portugal.
16. Italy and the Italians.
17. The Balkan Peninsula—relief and routes (a high-way between Asia and Europe).
18. The British Isles and Europe. Highlands and lowlands. Physical regions.
19. The climate of the British Isles. Farming and farmers.
20. Fisherman and the Fishing Industry of the North Sea. Wheatlands, cattlelands, sheeplands, fruitlands.
21. Miners and manufacturers. The coal fields of Britain.
22. The Industrial Regions of Northern England. Cotton, wool, iron, steel, ship-building.
23. The industrial regions of the Midlands; metals, pottery, leather.
24. Wales and South-West England. The South Wales coalfield; Iron and steel, tin-plate.
25. Scotland. The central Lowlands. Glasgow.
26. Ireland. The Irish Free State. Northern Ireland.
27. London and S. E. England: the great city and port.
28. Madras to N. W. Europe by sea, rail and air.

Text-book,. etc.—"Lands and Life" Human Geography—Europe—by Horniblow, published by the Grant Educational Co., London.

Books recommended for Teachers.

Method—

1. Principles and Practice of Geography Teaching, by Barnard (University Tutorial Press), 1933. Ch. I to VII. Rs. 3.

2. Memorandum on Curriculum—III—Geography (Published by London County Council), 1933, 6 annas.

3. Suggestions for the Teaching of Geography in India, by E. A. Macnee (Oxford University Press). Rs. 1-12-0.

4. Fundamentals in School Geography. by Olive Garnett (Harrap & Co).

5. Modern Teaching, Vol. 2, Geography, by R. Finch (Published by G. Newnes). This is a very good reference book, but is not sold separately.

Physical Geography—

1. Outlines of Physical Geography, by H. C. Barnard (A. & C. Black.).

Or

Oxford Picture Geographies, by Herbert McKay (Oxford University Press). Rs. 2-6-0 each—

1. Mountains, II, Rivers. III. The Coast, IV. Climate.

Observational Geography—

1. Everyone's Book of the Weather, by Francon Williams. (The Sheldon Press, London).

2. Outdoor Geography, by Hatch (Blackie). Rs. 1.-12-0.

3. Experimental and Outdoor Geography, by Wilmore (G. Bell & Sons). Rs. 1-3-0.

Human Geography—

1. Oxford Picture Geographies, by Herbert McKay (Oxford University Press). Rs. 2-6-0 each—Book V—Communications. Book VI—Towns and Industries.

2. A Geography of Common Things, by Barnard (Macmillan).

3. A Junior Economic Geography, by O. J. R. Howarth (Oxford University Press). Rs. 1-12-0.

Atlases—

1. The Indian School Atlas, by Bartholomew (Oxford University Press). Re. 1.
2. Longman's Senior Atlas for Indian Schools. Rs. 2.
3. The Royal Indian World Atlas, by Bartholomew (T. Nelson & Co.) Re. 1.

Reference Books for Pupils—Forms I to III.

Text-books—

Books on the lines of the following:—

Cambridge School Geography V and VI—E. D. Laborde (Cambridge University Press).—VI. Northern Lands, V. Southern Lands.

Columbus Regional Geographies—Books I, II and III.

The New Age Geographies—Senior Series, by Stamp (Longmans)—Book V—Regions of the World; Book VI—Countries of the World; Book VII—Rest of the World.

Lands and Life—Human Geography, by Hornblow (Grant Edn. Co., Macmillan)—Books IV, V and VI—Parts I and II.

World Geography for Middle Schools, by Druit and Stamp (Published by Longmans).

Human Geography—Primary Series, by Fairgrieve—Books IV, V and VI (Published by Longmans.)

Atlases—

Vernacular.—Longman's Vernacular Atlases (Longmans), 12 annas. Oxford Vernacular Atlas (O.U.P.) 12 annas.

English.—The Tajmahal Atlas (Longmans). Rs. 1-6-0. Indian Schools Atlas, by Bartholomew (O.U.P.) Rs. 1-6-0.

Learning Geography

NEW METHOD

The London County Council Education Committee is considering the most picturesque scheme of teaching geography that has yet been evolved. It is proposed to extend to a hundred London schools the system, tried experimentally by four schools, by which each school "adopts" its own tramp steamer, exchanges letters with the master and other officers, follows her progress, receives all the details of her cargo, and even visits her when she arrives at an accessible port.

With the co-operation of a firm of steamship owners, four steamers were "adopted", and by correspondence the pupils have been able to trace the voyages, and it is claimed that by this scheme pupils have gained what is virtually first-hand information regarding foreign lands and trade routes in a manner which gives them a far greater appreciation of the real facts of geography than mere routine lessons could ever do.

Twice parties of boys from one school have visited the *"Dartford"* in the London docks and have watched her unloading her cargo. They have been shown all over her; the chief engineer has shown them all over the engine room, and the wireless operator, the wireless apparatus.

The company has supplied all the details of her freights and the school has worked out her earnings on each voyage, the coal she has burned, and so on.

The officers' letters have been full of detail. In one, for instance, the captain described how, at a port in the Crimea, Soviet officials carried out a special search for stowaways. In another, the first officer described how masts and funnel had to be lowered during a passage of the Manchester Ship Canal. In a third, the captain described the fumigation of the ship with cyanide at an American port, because Alexandria from which the "Dartford" had sailed was scheduled as an unhealthy port.

"All this has helped to give the boys a practical appreciation of the facts of geography and commerce," a master stated. "You can tell that by the questions they have sent to the captain . . . . .

They follow the movements of the 'Dartford' in the shipping reports in the papers and bring into school cuttings about alterations in freight rates and shipping news of all sorts.

"Each boy keeps two books, in one of which he maps the voyages of the 'Dartford', and in the other a complete summary of her voyages, the ports she calls at, where she coals, and how many tons she takes on board, the details of her cargo, the weather, and so on."

The new scheme is not to be limited to London and about 800 ships are expected to be available. In fact, it may be that in the future one of the recognised duties of officers in the Mercantile Marine will be the writing of the school letters!

—*The Hindu Educational Supplement.*

Exploration

REGIONAL SURVEY

EDITED BY MABEL M. PARKER, D.ES.L.
Published by The Le Play Society

GET TO KNOW YOUR OWN PLACE AND WORK AND FOLK

" Every Village, Town or City is not merely a Place in Space, but a Drama in Time." " All Time has gone over all Places," and " Every Place is the centre of the World."—*Patrick Geddes.*

The place in which you live has largely determined the nature of the work which is done in it. This work in its turn has influenced the lives of the people. Try to know all you can about your Place, in the Present and the Past, and so help to make for it a great and happy Future. *Begin where you are.*

1. GENERAL APPROACH

1. Walk all over your region till you know it well enough to draw a sketch map from memory, noting rivers, relief, roads, houses and uncultivated land. See what its people are doing, for a living.

2. Try to get a general idea of its history. Visit the nearest library and museum. Begin to make a small museum of your own.

3. Become familiar with the readiest means of travelling about your region.

2. GEOLOGY

1. Examine the surface soils; note their colour, kind and variety.

2. How deep are they ? Look at the tops of quarries and cuttings, as well as ploughed fields and gardens.

3. What are the rocks like beneath the soils ? Collect specimens of local rocks and minerals; label them if possible, and photograph the landscape they come from. How does the geology affect the landscape and scenery?

4. Are there any fossils in the rocks ? If so, collect and name them; or draw and describe them. If there are none, find out why.

5. Find as many exposures of rock as you can. (Pits, quarries, river-beds, cliffs, etc.) Map them. Note also any large and peculiar boulders.

6. Are any valuable minerals found in your district ? If so, are they worked, and what for ?

7. Note any connection between the geology and human settlements at any time.

3. RIVERS AND WATER SUPPLY

1. What rivers and streams flow through your region ? Where do they come from, and where do they end ? If possible, follow one at least from source to mouth. Mark the drainage area on a map.

2. In what part of the district, and on which kind of rock are: (a) streams, (b) springs, most abundant ? Are there any dry valleys, and why ?

3. Find out how the inhabitants of your district get their domestic water. Map the areas served by :

(a) A water company's mains.
(b) Wells with pumps or windlass.
(c) Springs or streams.
(d) Rainfall on roofs.

Trace the supply to its source, if possible. Note the depth of the wells, and how far you must dig before reaching water. Is this always the same ?

4. Is the water hard or soft, or has it any peculiar colour, flavour, or other property? If so, why ? Is it always good and reliable ? If not, why ?

5. Do the farmers obtain water from any other sources ? How are their ponds filled ? Are there any dew ponds ?

6. Are there any mills or factories which use water ? And for what purposes ? Do they obtain it in any other way than from the domestic supply ?

7. Are there any lakes, tarns, ponds or marshes in your region ? How are they filled, and what becomes of the overflow? What is their height above sea level and the depth of the water in them ?

8. Are any areas liable to flooding ? If so, study the extent and cause of it.

4. WEATHER AND CLIMATE

1. Keep a record of the number of days in the year upon which rain falls. If you have a rain gauge or can make one, keep this record in inches. Note also when snow falls, and its depth.

2. Keep a record of the number of days in the year upon which the sun shines. Note the number of hours of sunshine per day (approximately, if you have no instrument).

3. If possible, get a maximum and minimum thermometer, and note at the same hour each day:

(a) Maximum.
(b) Minimum.
(c) Actual Temperature.

Note on how many days frost is recorded. (Keep the thermometer on a north wall, and out of direct sunlight.)

4. Get a copy of the Meteorological Observer's Handbook for any year, and learn the equivalents of the Beaufort Scale of wind velocities. Make a diagram to show direction of winds each day. If you have a barometer, or access to one, keep a record of its height daily.

5. Note the daily prevailing type of cloud, and see if you can trace any connection betwen this and the weather conditions.

6. Keep a dairy of outstanding events; as thunderstorms, torrential rain, aurora displays, eclipses, etc. Compare your records with those given in the Book of Normals, issued by the Meteorological Office.

Note.—The figures from all these records are. if accurately kept, of value to the Meteorological Office, and will be accepted by it. All readings should be taken at the same hour daily.

7. Note the effect of wet and dry seasons on:

(a) River floods.
(b) Condition of springs.
(c) Condition of local gardens, farms and crops.

8. Note any Folk Lore relating to weather.

5. VEGETATION AND OPEN SPACES.

1. Find out what uncultivated lands there are in your district. Make a tracing of them.

2. Divide them into open heath , marsh, mountain pasture or woodland; distinguish between these on your map, and list the plants growing in them.

3. In the woods find out:

(a) The shrubs growing under the trees.

(b) The trees, what kinds are most common.

(c) The ground flora (flowering plants, ferns, mosses and liverworts, fungi).

Compare the woods, and if your lists are very different, show the different kinds of wood on your map; especially deciduous and coniferous woods.

On what kinds of soil do the different woods grow?

4. Note carefully any curious or rare plants; and try to insure their preservation.

5. Note what edible plants grow wild in your district; and which bear poisonous berries.

6. On a six-inch to a mile map, note every year the crops growing in each field, and the grass meadows and enclosed pasture. (Get in touch with the Land Utilisation Survey in connection with this). Work out the local rotation of crops. What becomes of the crops?

7. Find out the ownership of the land and rights of access to it. Map extent of the estates, and acreage farmed in each case.

8. Map the different farms and give names of farmers. How long has each family farmed the same land? Also, state if all the land farmed is in the same parish ; if not, how far away ?

9. Try to find out what changes have taken place in the vegetation of your region during historic times; as clearing or planting of forests, enclosures, lapse of cultivated land, of cutting up of fields for allotments.

10. Try to make an imaginative map of the original vegetation before man interfered with your region at all.

6. ZOOLOGY.

(a) Mammals.

1. What furry animals are found wild in your region? Make notes on how they live, and how numerous they are; and give place, date and time of day, where and when you see them.

2. Draw all the wild animal tracks you can find on snow, sand, or any other soft ground, and name them.

3. Make notes on the supposed winter sleep (hibernations) of dormice, squirrels, hedgehogs, badgers, etc. Note if any of these are ever seen in winter, and how early and late in the year.

4. What can you find out about the food of wild animals? What effect, if any, has it on crops, gardens, and other animals? (Deer and crops, foxes and hens, rabbits and gardens, otters and fish, etc.)

5. What domestic animals are bred? Note approximate numbers and what is done with them.

(b) Birds.

1. Note all birds seen in your district—(a) in summer; (b) in winter. Draw their tracks, as above.

2. Keep a record every year of special dates, such as: first arrival of migrants, first and last swallows, cuckoo and nightingale heard, first blackbird's egg found. (Refer again to Phenological Report for many other details that will help and interest you here.)

3. Keep a record of birds' nests, and find out if any are used for more than one year. Note materials used. Make coloured drawings of eggs (do not collect them), and give average numbers in a clutch.

4. Find out the period of incubation for each species,

5. Try to find out the food of each species, and what relation, if any, this has to crops in your district.

6. Note the appearance of rare and occasional birds, and try to find out which species are increasing and which decreasing in number and the reason for this.

(c) Amphibians, Reptiles and Fishes.

1. Note carefully the first dates on which you see Frog, Toad and Newt spawn. Keep a record of when they hatch into tadpoles, and when they leave the water as mature animals.

2. What fishes are found in your rivers, lakes, and ponds? Compare them. What are the conditions as to fishing rights?

3. What other living creatures can you find and study? Note again place, date and time. (Lizards, blindworms, snakes, etc.)

Are any of them harmful to man, or to crops and domestic animals?

(d) Invertebrates.

1. Are there any edible creature other than fishes in your waters? (Crayfish and mussels, and salt water molluscs.)

2. Make a record of the small creatures to be found in your rivers, ponds and streams. Compare them. Which leave the water as flying insects; and of these, which are harmful to man or beasts?

3. Make lists of moths and butterflies. Draw, but do not collect them.

4. Using a simple classification frcm any book on Natural History, make a list of other groups of insects, beetles, bees and wasps, spiders, ants, etc. Which of these are destructive to vegetation and should be destroyed?

5. What steps, if any, are being taken in your district to fight insect pests ? (See Board of Agriculture leaflets, and if there is an Agricultural College, get in touch with it.)

7. ARCHÆOLOGY.

1. Note any prehistoric sites, such as camps, tumuli or megaliths, which are marked on the ordnance map. Visit these and study them. Make a tracing of their position from the map, showing their relation to water and contours.

2. Try to get any information available as to their approximate period—are they Neolithic, Bronze, Roman or Mediæval in date?

3. Look out for prehistoric sites *not* marked on the ordnance map. Any artificial heap of stones, not easily explicable, may be a tumulus. Note earthworks, trenches, etc.; map these and go on trying for explanations of them.

4. Are there any green roads, bridle paths, lynchets, or ridgeways (especially in relation to the above)? Map them.

5. Have any ancient tools, weapons, jewellery, coins, pottery or bones been found in your region? If so, mark the exact site on your map if you can determine it, and note also date of discovery, who found it, and where the thing is now.

6. Visit the nearest museum and draw all such objects, which are of the greatest help in dating and in explaining the foundations of your local history.

7. Get in touch with the local Archæological Society, and seek all the help you can. Do not attempt excavation unaided.

8. HISTORY.

1. What traces are there in your locality of the Roman Period? Visit and map Roman roads, towns, sites, military camps, villas, etc.

2. How far do these correspond: (a) with the prehistoric settlements? (b) with settlements at the present day? Why have old sites often been abandoned and others chosen?

3. Map in relation to rivers and contours and roads the position of all towns and villages in your region. Try to see whether they are in origin market-towns, ports, castle-towns, abbey-towns, cathedral cities, or at the junction of routes.

4. If you can get hold of old maps and prints, preserve them carefully, and use them to find out as much as possible about past conditions.

5. Map old mills, inns, pack-horse tracks, toll-bars, granges, etc. Make a tracing of the parish boundaries and other boundaries.

6. Make a study of the Parish Church, and Glebe land. Trace origin, development and history of castle or manor, abbey or priory, town-house, etc.

7. Study the original Forest Laws, and how far the present population maintains them.

8. Make a time-chart of notable events in the history of your region. Record in it and make a special study of notable men and women.

9. If you are interested in drama, work out the story of your regions as a series of episodes suitable for presentation as a pageant.

9. COMMUNICATIONS.

1. Make a tracing showing: (a) Modern roads; (b) Footpaths; (c) Railway; (d) Navigable rivers, and canals.

2. Note and map telegraph offices, post-offices, public telephones, wireless stations, if any, and aerodromes, if any, in your region; also fire alarms and any other means of communication.

3. Make a study of railways and motor-bus services, both in your district and passing through it. Find out the distances by road, and the time taken by bus and train between the chief towns of the district, or to the nearest large town.

4. Compare the present roads and means of communication with those of pre-Roman times and of the Middle Ages.

5. How far are main lines of communication determined by geology and vegetation?

10. OCCUPATIONS.

1. What are the principal occupations of the people in your region at the present time?

2. Which of these are fundamental to the life of man anywhere (as agriculture, fishing, etc.), and which are concerned with special local products (as linen in Belfast, basket-making in Fenlands, etc.)?

3. What survivals are there of the work of former generations? (as old carvings, iron-work, sundials, inscriptions over doors, etc.)

What old crafts are still practised?

4. What can the old folk tell you of changes in occupation that have taken place in their lifetime?

11. FOLK-LORE AND LEGEND.

1. Collect records of old customs and sayings peculiar to your region.

2. Take down recollections of old people: for example, their memories of special celebrations (Jubilee, Crimean War, etc.); of when certain mines or mills were worked, of notable people they have known.

3. Find out local traditions about people and places, e.g., haunted houses, haunted roads, sounds of galloping horses, sites of buried treasures, underground passages, etc.

4. Collect interesting family records. Look up Parish Records, if possible. (Early ones are often printed and obtainable in a local library.)

5. Have there been immigrations into the district for special purposes? As of Cornish people to help with mining, instructors in weaving or pottery, or foresters for planting or felling, etc.

6. What survivals are there of old charity bequests, or special family bequests; doles of bread and clothes; almshouses with peculiar conditions attached; or trusts connected with church or school; or rights of "wooding and gleaning"?

7. What manorial rights survive? Are these meetings of Courts Baron or Leet?

8. What literary associations are there? Make notes of references in classical writers to your district describing it in the past or present.

9. What poets, artists, architects or writers has it produced? And how far have these expresed its character?

10. Are there any living artists or novelists whose work deals now with local life and scenery?

11. Study and record local dialects.

12. Make a collection of local folk-songs and dances, if you can find them. Learn these songs and dances, and work them into your local drama.

13. Copy all interesting inscriptions in churches, chapels, churchyards or elsewhere.

12. PLACE NAMES.

1. Find out and map the names of the fields in your area. (If the farmers or villagers do not remember them, they can often be gŏt from title deeds, surveys, terriers and manorial records.) State in every case the source of your information. If from a document, say what it is, where it is now kept, and give its date. If the names are in use to-day, this should be stated. Record any unusual local pronunciations of place-names.

2. Study the place-names. Find out, from the publications of the English Place-Name Society, which are British, Roman, Scandinavian, Saxon, etc. Map them, using a different colour for each, and so use them to get an idea of the invasions and minglings of peoples in the past.

3. Are there outstanding physical types among the people at present?

4. Make a study of surnames, past and present. Use old tombstones and parish records and initials over doorways. How far back do some of the names go that are still common to-day?

13. MODERN AND CHANGING CONDITIONS.

1. Make tracing showing boundaries of modern civil parishes; District Council areas, Parliamentary Representation Divisions, etc.

2. How is your district governed? How are the local governing bodies constituted and elected?

3. How are you supplied with gas, electricity and water? (See Section 3.) Who looks after them, and who pays for them, and how? Does the National grid pass through your area?

4. What changes have been made in your region by modern methods of industry?

5. Make a map to show density of population to-day (Returns can be got from Census Blue Books.) Try to find out what it was twenty years ago, and a hundred years ago. If possible, make a graph to show changes in population.

6. Get the report of the local Medical Officer of Health, and make a study of health conditions and birth and death rates (these are best shown by graphs).

7. Visit and make notes on present-day institutions and their influence, e.g., hospitals, schools, colleges, village halls and institutes, places of worship, places of amusement. What local societies are there, and what is their work?

8. Map any building put up since the ordnance maps were made; and note housing sites.

9. What changes in your district are due to the Great War? What happened there during the Great War?

10. If it is an industrial district, what are the facts about unemployment, and what is being done about it?

14. CAMPING AND RAMBLING.

1. What good camping sites can you find in your region? Make notes on them as regards:

(a) Wood and water supply.

(b) Ease of access, combined with privacy.

(c) Food supply.

(d) Nearest shelter, farm or village, in case of emergency.

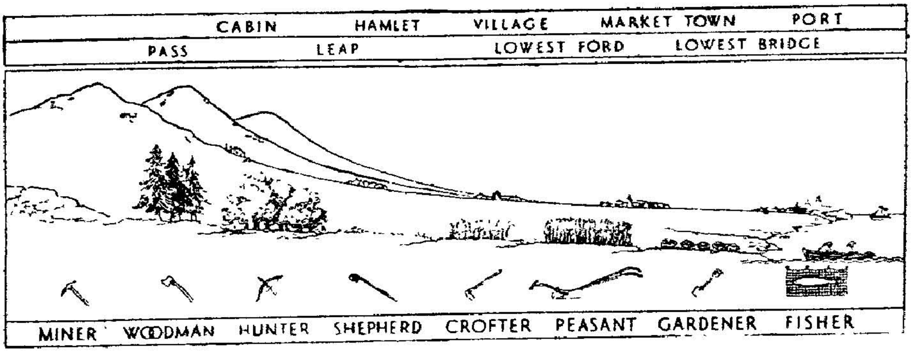
(e) Names and addresses of owners, and under what conditions camping is allowed.

2. Make a list of Youth Hostels, Inns, and other suitable halting places for walkers in your region.

3. What opportunities can be found in it for mountaineering, boating, swimming, skating, or other outdoor and healthy enjoyment?

4. Find out and map all public footpaths and rights of way. (Many of these are in danger of being lost or forgotten.)

These are the tools which are needed by an explorer in your place, or any other:–Ordnance Survey maps photographic camera; pocket lens; compass; knife and string; pencil and pocket book; coloured pencils, inks or paints; tracing paper; a measuring tape is also useful, but if you cannot get all these at first, begin with a note-book and pencil.



NOTES.

RELATION OF YOUR REGION TO OTHER REGIONS.

If you learn to know your own place well, and in so doing learn to love it more, it will help you to understand and appreciate all other places, and to sympathise with their problems. Regional loyalty and world citizenship are two poles of one magnet.

EXTENT OF SELECTED REGION.

The area to be "surveyed" must depend upon many things; as, for example, the age, number, and experience of the workers;

their facilities for getting about; and the purpose for which the work is being undertaken. But in general, do not limit your exploration to one sheet of the ordnance map, one parish, or any other artificial boundary, although for convenience you may be obliged so to limit the mapping of it. And whenever you get the chance, go further afield, relating your region to those around it.

METHOD OF RECORD.

It is suggested that results be mounted on standard sheets of brown paper, which can be pinned up for exhibition as desired, or filed in a labelled dossier made of a double sheet. Graphic methods should be used wherever possible: i.e., use anything—pictures, maps, prints, graphs, photographs, models, diagrams—that will illustrate the region upon which you are working. Make explanatory notes, lists, etc., as clear and brief as may be. Your survey should be **seen**, not read. A set of tracings of the same area and on the same scale (probably from the one inch to mile map) should be made for superimposing upon each other, each tracing embodying one idea (as contours, rivers, etc.) This clarifies a crowded ordnance map, and brings out the relationship of one factor to another.

NOTE FOR TEACHERS.

When beginning local study with young children no printed map need be used until they can make their own sketch maps, of a limited area, from memory. They will then easily read and understand a 25-inch to mile ordnance map. For older pupils and students a 6-inch to mile map is soon necessary.

The whole scheme is intended to help beginners to make a beginning. Try the section that appeals to you most. **Once get going, and you will soon make your own scheme.**

The Earthquake at Quetta

GEOLOGIST'S REPORT

Mr. W. D. West, of the Geological Survey of India, in a geological account of the Quetta earthquake of May 31, published by the India Office, states that for mortality it must rank as the most disastrous earthquake that has visited India within historic times.

The nearest approach to it (he continues) is the Kangra earthquake of 1905, when 20,000 people perished (as compared with an estimated 30,000 in Quetta and the surrounding country). The area affected, however, is likely to be less than 300,000 square miles, whereas 1,900,000 square miles were affected by the North Bihar earthquake last year, 1,625,000 square miles by the Kangra earthquake, and 1,750,000 square miles by the Assam earthquake in 1897.

Perhaps the most striking feature (says the writer) was the very short time that the earthquake lasted, probably less than half a minute. During this time the ground was viciously shaken in a horizontal plane at a high speed. The motion was described by many as being like a terrier shaking a rat. The intensity of the shock was such that it is reported to have thrown the seismograph at Calcutta out of adjustment, though situated at a distance of some 1,400 miles from Quetta.

The earthquake had no connexion with volcanic action, "and the inhabitants of Baluchistan may rest assured that there is not the slightest likelihood of volcanic activity breaking out in this part of India."

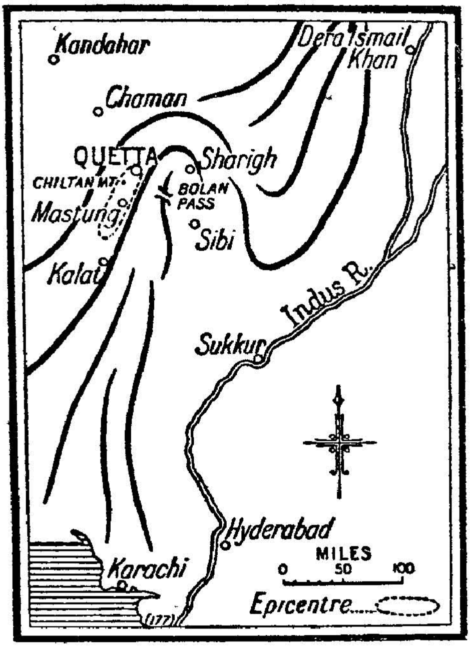
CAUSES OF THE EARTHQUAKE

Discussing the causes of the earthquake, Mr. West says:

The hills of Baluchistan have been folded by a compression coming from the north-west. The softer rocks have been folded and pushed southeastwards towards the rest of India, in the way that a person might push a cloth on a table horizontally, causing the cloth to pucker up into long folds in front of his hand.

Between Peshawar and Karachi the alignment of the mountains is not a straight line, but is abruptly disturbed by a marked re-entrant angle running up through Sibi to Quetta (indicated on

the accompanying map). It almost appears as though some obstacle were holding up the free movement of the mountain folds towards the south-east. It may be that a wedge-like promontory of Peninsular India extends up towards Sibi beneath the alluvial covering, and is acting as an obstacle to the free movement of the



mountain folds, causing this re-entrant angle. If this suggestion is correct, then the rocks at the apex of this angle must be in a condition of great strain; and it is possibly the sudden yielding of the rocks as a result of this strain which causes the numerous earthquakes which visit this part of Baluchistan.

If the movement which caused the recent earthquake be regarded as having afforded relief to the accumulated strains within the rocks of that area, then further earthquakes are unlikely to be located again along the Quetta-Mastung line for a long time to come. Should more earthquakes visit Baluchistan in the near future, the probability is that they will be located in some other part of the country where the strains have not been relieved by the present earthquake, though of course they may be felt to some extent at Quetta.

It seems clear, however, that the correct way of anticipating further earthquakes and of minimizing their disastrous effects, both in Baluchistan and elsewhere in India, is to construct buildings which will withstand these severe shocks.

Some Aspects of the Polar Regions

ADDRESS BY

PROF. F. DEBENHAM,

President of the Geography Section of the British Association for the Advancement of Science.

At a Meeting in Norwich, September 1935.

We are accustomed to the saying that the world is becoming smaller every year, yet it is still the privilege of very few to visit personally all the major regions of the world. We do say, and say wisely, that it is the duty of geographers, if possible, to visit the lands of which they read and write; but we know all the time that this is a counsel of perfection so rarely attained that it may almost be left out of practical consideration. We are, in fact, in the mass, still immobile on this world of ours, and we still have to take our impressions of regions other than our own from picture and narrative. Nevertheless, with so many travellers apt at descriptive writing, with such a world-wide Press, and, perhaps even more vitally, with so much broadcasting, we can, if we care to try, summon a very clear picture of the main natural regions of the world. It is not, for instance, difficult for the normal reader to imagine the green hell of the Amazonian forest, the parched solitudes of the great desert belts, or the towering magnificence of the Himalaya.

Each of us, according to the extent of our reading and the vigour of our imagination, carries a picture in our minds of these major regions, and no doubt all of you have a fairly vivid picture of the polar regions in your minds. What is not so easy to come by, however, is an appreciation of that picture in terms of its value to mankind. I propose, therefore, to guide your facility for correlation by briefly sketching, not the polar regions themselves, of which you already have an idea, but the influence those regions may have, and perhaps should have, on both the material and the ethical progress of mankind.

There is now a vast literature of the polar regions, both north and south, but the proportion of those books and papers which deal with the subject on a broad basis is very small, and is cer-

tainly not easily accessible. In many of these books we are invited to conjure up the sensations of the polar explorer, to feel his frost-bites, to savour his pemmican, to glory in his pack-ice and his glaciers, even to die his death. Not the least part of our interest in polar work is due to these invitations so graphically offered to us in text and illustration.

Much more rare is it to find a polar explorer viewing his territory as a whole, and trying to fit it into the scheme of the world in general. In a word, we are rather encouraged to regard the polar regions as places apart, extraneous to the real comity of the world.

It is perhaps a natural but nevertheless a lamentable fact that immediately one speaks of values the listener interprets it in pounds, shillings and pence, and indeed many will never get farther than that, and can hardly conceive of a value that cannot be stated in the terms of the economist. We will therefore first consider the kind of value of the polar regions which appeals most quickly to the public.

There is little need to sketch the history of man's attempts to achieve economic gain from the polar regions. From the days when Martin Frobisher attempted to find a quick route westwards to the Spice Islands *via* the North-West, and Barents a similar route eastward, down to more recent times when, though the routes had lost value, the products of hunting, fishing and mining attracted venturers with similar motives, the chief aim of promoters of polar expeditions has been one of ultimate gain. It is true that many of the leaders of the expeditions had little care for the commercial side, but the money that sent them forth was, in the greater number of cases, put out in the time-honoured hope of all ages that it would bring in interest in some form or other.

There is certainly such a thing as the romance of commerce in the North, for most of its industries have something peculiar and unusual about them. We may instance the cryolite mines of Ivigtut in Greenland,—a strange mineral found in quantity nowhere else in the world, which however is almost essential to the large-scale production of aluminium. Again, until recently a large proportion of the ivory for use in northern China did not come from the present-day elephants of the rain forest belt of Asia, but from the mammoths of primeval times whose tusks lay for many thousands of years buried in the mud of the great Siberian rivers flowing into the Arctic Ocean.

Romantic or not, the story of Arctic trade has a grim and melancholy side, in that several of its most promising ventures have died a slow and painful death by reason of the cupidity of man and his unwillingness to co-operate either to preserve life or even to preserve it sufficiently for his own benefit. The history of the whaling industry in the Arctic is an instance of this incapacity of man to co-operate in taking the most common-sense measures to cherish a valuable industry. There is every reason to hope that the day of non-co-operation has passed and that a similar fate to whaling in the Antarctic will not take place, for it is probably common knowledge that many bodies, in which we may include the League of Nations, the Norwegian whalers themselves and the Discovery Committee of the British Government, are at work in their various spheres to prevent any extermination of the southern whales, and at the same time to regularise an industry which, even in these days of synthetic materials, still has its vital uses to man. How large that industry now is may be gathered from the fact that the annual catch of whales in the southern seas is about 20,000: how mindful it now is of its own future may be seen from the fact that whereas the average whale used to provide only 60 or 70 barrels of oil it is now made to yield nearly 120 barrels of oil besides other products.

The fur trade in the Arctic has never suffered quite such staggering blows as the whaling industry, yet it is not so very many years since nothing less than international complications were a strong enough threat to ensure that the fur-bearing seals should not be exterminated as a species. That is precisely what did happen in the Antarctic in the early years of last century, when in less than a decade all but a few hundred of this kind of seal were slaughtered.

These products of hunting, fishing and mining were the natural resources of the North and were the first to be exploited, but quite recently a new factor in the commercial aspect of the North has come to the forefront. With the progress of long-distance aviation and the simple application of the principle of great-circle navigation, the idea of using these northern latitudes for passenger and even freight routes in the air has become not only prominent but almost insistent.

Owing to the misleading projections on which most of our maps are constructed it is not usually recognised that the most direct route between, say, Berlin and Montreal or Glasgow and Winni-

peg is over Greenland, but it is so. It seems to be only a matter of time and the inevitable improvement of aeroplanes before some use is made of a route which was first investigated as to conditions by the Watkins Expedition of 1930.

All these economic aspects of the Polar regions necessarily have a political bearing. Though it was not until the present century that the great Powers began to take a close interest in the idea of possessing polar territories, there has been in recent years a degree of keenness in this respect which is not dissimilar to that which prompted the partition of Africa in the latter part of last century. In the eyes of the historian of the future it is probable that the more or less forcible partition of Africa will be regarded with condemnation, since in that case there were peoples whose rights had to be ignored, and a degree of envy and jealousy between participating nations which was far from being creditable. In the polar regions the case is different, in that those lands which had a native population were taken under protection at an early date by Russia, the United States, Canada, and Denmark. Though there has been, since the great war, a rush for the remaining unclaimed land areas of the north this was, however, carried out with a reasonable lack of animosity between the nations concerned. In the north there are now no tracts of land which are not either settled in part or specifically claimed by one of the Powers. The recent adjudication of rights over East Greenland by the International Court at The Hague in favour of Denmark has settled what might have been a standing cause for bickering.

In the Antarctic regions, which are far less known than the Arctic, the political aspect has come forward of recent years almost entirely on account of the whaling industry which, though now largely carried out at sea, had at first to depend upon land stations for its full operation. It cannot be said, even by the British nation, which claims the greater part of the Antarctic continent that the matter is settled in a satisfactory way as yet. It seems that none of the usual precedents of international law can be made to apply to the land mass of Antarctica, for not only is occupation, in the proper sense of the word, more or less impossible, but not even the most sanguine company-promoter could say that the land, as such, has a value. The wealth of the Antarctic to man lies in the seas around it, which are free to all, and such claims as there have been for land sectors have been based variously on the protection of whales, the pursuit of whaling, the juxtaposition of civilised land and possibly, but not certainly,

the assertion of land claims merely as a gesture. Naturally these claims are apt to be inconsistent.

It is difficult, if not dangerous, for the layman to step in where only the diplomat is accustomed to tread, but one is forced to wonder whether the various Foreign Offices concerned in claims to territory in the Antarctic have been fully and wisely informed as to what is the real value of some of the zones or sectors which have been the subject of negotiation in recent years. A claim to land which is almost entirely covered by ice, which has no harbours and can rarely even be approached by a ship is surely a shadowy if not a useless one, and invites the suspicion that an aggressive and capricious spirit lies behind the claim.

None of the nations concerned is quite free from blame in this respect, and no special nation is referred to in particular.

It is probably too late for any alternative arrangement to be adopted, but had there been a League of Nations in existence at the beginning of this century, before any claims had been laid in the Antarctic, the protection and administration of this last and least useful continent would have been a most appropriate subject for League administration as an 'international park' of vast proportions which should be open to all nations who would respect its amenities.

Political might-have-beens, however, are no more useful than social ones, and claims to territory, which can do little beyond giving a large splash of colour on the map, are bound to continue.

One point, however, must be made clear as a matter of common justice to possible claimants, and that is that territory claimed should at least be investigated, and we can well imagine that it is for the purpose of carrying out this obvious duty that the British Government has felt kindly towards recent Antarctic exploration by its nationals.

Summing up this economic aspect of the polar regions, the warning may be given that even now, as in the past, there is a tendency to ascribe potential wealth merely on account of the existence of land masses. Indeed, even explorers, who should have known better, have been heard to speak glibly of the untapped mineral resources of the polar lands, neglecting to tell their public that though these resources undoubtedly exist, they are for the most part covered by thick ice sheets or rendered inacces-

sible by topography, or climate, or both. Quite a brief calculation, for instance, would show that the proportion of the Antarctic continent available to the prospector and miner is to the total land mass in somewhat the same proportion as the area of the city of Norwich is to the whole of England.

Although the land can have little value in the Antarctic there is, strangely enough, a natural resource in the air which, however fantastic it may appear to us, may yet have a substantial interest for our descendants. It is a truism of science that we draw practically all our sources of power from the sun, either indirectly in the form of coal and oil, or directly in the form of water power, in which the sun by evaporation has raised water to a height from which gravity, suitably used, returns power to us. Now, although water is one of the things of which there is a great scarcity in the polar regions, and the movement of ice masses can hardly be handled by engineers, yet meteorological processes are doing the same thing for air, raising masses of air in one area which sink down in another, and so provide a source of power less tangible but just as real as that of water in a highland lake. The persistence, the strength and the frequency of the Antarctic blizzards compels anyone who has experienced them to feel that here is a vast source of power as yet untapped. May we be permitted to forecast that some day the miseries of the storm-bound parties of Mawson's expedition, when for a whole year the wind averaged gale force may be atoned for by our descendants making use of this power when coal is scarce and oil exhausted, while all the water power in the temperate regions is fully harnessed ?

It would be unwise and inappropriate to burden a presidential address with statistics of wind in the Antarctic, but I do invite you to compare in your mind the power in the well-known falls of Niagara, about 6,000 tons of water falling per second, with the power in the little known Adelie Land, where an air river of at least 50 miles in width and probably some hundreds of feet in depth is moving outwards from the plateau at an average velocity of 50 miles per hour or about 70 ft. per second for most of the year.

I will not further anticipate some H. G. Wells of the future who will ring the Antarctic with windmills producing power to be sent by wireless to the southern hemisphere, but merely assure my audience that the winds of the Antarctic have to be felt to be believed, and that nothing is quite impossible to physicists and engineers.

We will not refer in detail here to the well-known efforts of the Canadians in particular, guided by the enthusiasm of Mr. Stefansson, towards increasing the pastoral value of the Canadian Arctic by the introduction and preservation of reindeer and other animals. This must go on; but in spite of Mr. Stefansson's arguments one is forced to believe that if we limit these efforts to the truly Arctic lands the net effect on the world production of meat will be slight.

We pass now from the economic aspect of our subject to some others which have less appeal to the man in the street, but which must never be omitted in any consideration of a region by a geographer.

If we ask ourselves why so many people have gone to the polar regions in the past for other than economic reasons, the answer is perfectly plain. To say they have gone because they wanted to is too bald a way of putting the answer. Their motive in going is because the polar regions have offered them something which they cannot get elsewhere. One of these things is solitude and relief from the company of too many of their fellow men. One must be careful in dealing with such an abstract part of the subject to define that love of solitude or, as the journalist would call it, 'the lure of the wide open spaces'. To begin with, it affects only a very small proportion of men and, I venture to suggest, very few women. It also is usually of a temporary nature, and the man who considers himself most content in the heart of the Sahara, or on the plateau of Greenland, is very often so content because he knows that at the end of a certain term of residence in such a place he has Paris or Piccadilly to return to for contrast. When he does return, however, he is likely to be bothered and fussed with the apparently seething mass of his fellow creatures, to be bustled out of his contentment by a world of telephones and postmen and the daily press, and to consider very quickly that the lives and aims of men in the mass are sordid and small compared to the simple life of the lands from whence he has returned. We may smile at these psychological effects, and we may consider that the explorer type, who is restless in civilisation, is a person apart, to be given his way but not to be pampered.

On the other hand, we must not forget that not only are holidays necessary to man, but that, with increasing rapidity and ease of transport, the holidays of civilised peoples will tend to be taken farther afield. Even before the War there were such things as

pleasure cruises to the North ; but what is just as feasible and has not yet come, is the extension of these cruises into summer holidays on land in the Arctic. Nor is it too wild a forecast to say that in time to come there may be a Brighton of Spitzbergen, a resurrection, in fact, of the Smeerenberg of two centuries ago, when each summer a large township established itself on Spitzbergen for the whaling. The township will be a city of rest and holiday instead of a city of greasiness and blubber ; but the means of establishing such a centre come closer to hand with every new invention.

It is true that the Antarctic can never be considered a playground for the southern hemisphere, except for those who are willing to undergo an uncomfortable, if not a risky, sea voyage or a rather long aerial journey. It is true also that in the North, under present circumstances, the amount of territory available for holiday purposes is practically confined to Spitzbergen, now known as Svalbard. The accessible parts of Greenland, for instance, belong to the Greenlander under the careful guardianship of Denmark, and must not be looked upon as a holiday resort. The Franz Josef Archipelago is not always accessible, and the more distant Nova Zemlya, as well as the Canadian Arctic islands, will be for a long time to come too far from the main centres of population in Europe and America.

This consideration of the polar regions as a holiday resort for the citizens of crowded lands, leads us naturally to a far greater value which has as yet hardly been considered by civilisation, a value which indeed may yet prove to be more worthy of study than all those we have so far mentioned. It is reasonable to suppose that when some far-travelled medical man comes to write a book on the geography of diseases we shall be able to come by a clear idea of where health is best to be sought. The ordinary geographer would, however, even now be able to make something of an essay on the distribution of healthiness over the world. Leaving out cities as unnatural, or at least unhealthy aggregations of humans, he would at once say that on the whole the most unhealthy parts of the world were in the Tropics, though he would have to have a special category for tropical and oceanic islands, which as a rule are decidedly healthy. He would, if he were wise, consider that the Steppe deserts were healthy zones ; but probably he would decide that the temperate zone as a whole, provided it is not too far from the sea, is the healthiest belt of the world for man. It is almost certain that he would entirely forget that the polar regions are definitely the most healthy segments of the earth's sur-

face, for the simple reason that the ordinary disease-bearers, whether they be rodents or insects or minute bacilli, find the conditions either impossible for existence or inhibitive.

But we are not concerned here so much with the healthiness of the zone as with its value from a remedial point of view, for we are certainly not going to migrate in millions to the Arctic just because we cannot there contract the diseases of our own lands. But what we may well pay attention to is the corollary to that healthiness, namely that many, though not all, of the diseases contracted in temperate climates can be cured by residence in the polar regions.

I am aware that it is more than dangerous, indeed provocative in the highest degree, for anyone outside the medical faculty to say how far special diseases are curable by residence in a pure air and a cold one. It seems, however, from the experience of sanatoria in the Alps, etc., that it is the sufferers from pulmonary diseases who are most likely to get benefit from such residence. The question will at once be asked as to what the polar regions can supply which is not already obtainable, say, in the Alps. For an answer to this question we must look to the doctors; but it does seem likely that residence in a vast territory free from germs or the conditions for their transport must, *prima facie,* be better than residence in an Alpine region which is surrounded by, and is merely above, zones teeming with possibilities of disease. If this thesis is correct, and it is one which a small period of research could easily confirm or refute, then surely we are neglecting an aspect of the polar regions which is of major importance to mankind, more valuable than all the industries they will ever support.

If it be true, as I believe, that the greatest gifts of science to mankind lie in the realms of preventive and remedial medicine, then surely here is an investigation which should not be left as merely a pious hope in a presidential address, but deserves promulgation and action.

To test the value of the suggestion there is needed some research and experiment, most appropriately to be carried out under the auspices of one of those international bodies such as the Rockfeller Foundation, which has already done so much for remedial medicine. For assistance in carrying out this research there is needed the sympathy of governments, especially that of Norway, in whose care is the most promising territory in the Arctic for that purpose, namely, Svalbard or Spitzbergen.

Let us remember too, before we allow hands of horror to be raised at the expense of such research, that in the past sums of money have been spent in Spitzbergen itself for the erection of an airship hanger and provision of the airship itself for a few hours' flight to the Pole, which would be sufficient to erect a hospital and run it for many years in an experiment which might be of permanent value to the world. We must be properly cautious as to results. but at the same time let us preserve our sense of proportion in the value to man of how we spend money in the polar regions. It is almost lamentable to consider the sums of money which have been spent in what you will all understand by the term of 'stunt expeditions' and place those sums in contrast to the difficulty in raising money for such an object as this.

I am aware that in thus inviting consideration of the possibility of establishing *sanatoria* in the polar regions I shall be incurring the displeasure of explorers, both of the past and of the present; but my answer to such would be that the end is worthy of the means, and that just as an Alpine hotel, full of youth and health, can now be found one hundred yards from a sanatorium filled with the ailing, there is room in the polar regions both for sanatoria and for expeditions.

We may now turn to yet another aspect of the polar regions, and one which possibly has a more direct appeal to this Association of scientists than those which have so far occupied our attention, namely, the value to the scientist, both pure and applied, of the phenomena which are peculiar to these regions—phenomena whose existence is well known but whose study is still in its early stages.

No doubt each science will claim the chief value of these phenomena for itself, but it is without any particular bias to one or the other that I should venture to place in the first rank the subject of meteorology as likely in the future to gain most by a prolonged and more intensive study in high latitudes.

We have spoken of the more or less permanent blizzards on parts of the Antarctic continent, and we ourselves live under the intermittent threat of depressions over Iceland. We can therefore, without much imagination, see that even if our weather is not actually manufactured at the polar ends of the world, it is profoundly affected by them. Meteorologists themselves have long been aware of this, and in two successive onslaughts, namely, in

1882 and in 1932, a determined effort was made to collect data simultaneously and widely within the precincts of the Arctic. The conclusions which have been drawn from these results are, as yet, hardly in full circulation, but you will meet few meteorologists who do not sigh for more and more data from the polar regions.

The phenomena of magnetism and aurora, which are somewhat akin to those of meteorology in that they occur in the atmosphere, are also best studied in high latitudes, where, too, the most promising investigations of the ionosphere seem to be likely.

When we come to the more earthly sciences, the immediate value to mankind is perhaps less evident. In the science of geology, for instance, especially in its branch of tectonics, we cannot afford to do without close investigation of two segments of the earth comprising together nearly one-tenth of the surface of the globe, and indeed the structure of the earth must become the more interesting the nearer one gets to its axis of rotation. The geologist has a hard task in lands where the rocks are usually buried beneath ice-caps, and has to be more than usually ready with the inspired guess than in other parts of the world.

In the Antarctic in particular, the highest of all continents and the most closely hidden, there are obviously to be found keys to some of the major problems of earth structure. We may instance only one which, no doubt, is occupying the attention of the geologists of the British Graham Land Expedition at the present moment, an expedition which hopes to press far to the south of the Archipelago where they are wintering, and to determine why and where the folded ranges of South America and Graham Land merge into or butt against the faulted escarpments of the Australian sector of the Antarctic.

It is in these larger problems of geology that the polar geologist can give most assistance to science. It is not long since the papers, in America at all events, were full of the discovery of coal beds by Admiral Byrd's geologist within 300 miles of the South Pole, and it was interesting to see that this discovery, which however was originally made by the Shackleton party in 1908, moved the press public to exclamations of wonder that such things could be. Nevertheless the great controversies of whether the Poles have shifted in the past, and whether the continents are drifting, must draw their best evidence, both for and against, near the axis of the earth.

There has recently been published a fresh determination of the position of Sabine Island on the coast of north-east Greenland which tends to show that there is a definite westerly drift of some metres per year. Similar observations of Jan Mayen are even more startling. For these and other reasons, therefore, the geophysicist, whom we may call the mathematical cousin of the geologist, must keep his attention on the polar lands.

In the biological sciences also there are major problems to which the data of high latitudes alone can give the key, such as the drift of oceanic waters and the movements of plankton and their associated salts. The biologists, however, are already active in these investigations and need no spur to action. The many-sided character of the work of the Discovery Committee in this branch, over all the waters of the Antarctic ocean, is evidence of how carefully work on this aspect of the polar regions is being carried out.

Lastly, I would ask your permission to consider yet another aspect of the polar regions, one which is perhaps more psychological than geographical, namely, their value as an outlet to that spirit of adventure and urge for exploration which has always been an attribute of man, and which will not diminish however small the world may grow. It is a spirit which is at work equally in the small child climbing the apple tree, the schoolboy exploring his own small horizon, the undergraduate forming alpine clubs to scale the peaks of his own college, and the city clerk spending his week-ends living dangerously in sailing dinghy or on motor bicycle.

In all of these there is a curious combination of an urge to test one's abilities and yet a desire for a secondary and more useful object in the deed itself, and this dual purpose is particularly evident in most of the young men who come to the Scott Polar Research Institute in Cambridge seeking ways in which to visit the Arctic.

Looking over the files of the geographical journals of the past few years, it is possible to see how many young men turn annually to the Arctic to satisfy their need for an outlet. If we include the official expeditions of governments such as that of the Soviet, we shall find that every summer more than fifty groups of investigators go to the Arctic and, were it less expensive, the number would easily be trebled. Only a few of these groups go for purely scientific work, and still fewer for hunting alone. They are, in fact, as a rule imbued chiefly with a desire to see strange places

and endure strange things, and only in a secondary way to bring back useful results. There has been of recent years a happy tendency for these groups to go and come back without undue fuss and publicity. I would suggest that this use of the Arctic as an outlet to a healthy and laudable desire is one which should not be left out of any assessment of values, even though it must necessarily apply only to a small number of people.

These suggestions as to aspects of interest in high latitudes will, no doubt, appeal to some and bore others, but in conclusion I would beg of you, as geographers, not to ignore these uninhabited zones, and I would like to repeat the words of a recent booklet on the subject, that whether it likes it or not, the world must take an interest in the polar regions.

News and Notes

We have to record with great sorrow the demise on 29-10-35 in London of Mr. Herbert Champion, Director of Public Instruction, Madras, a foundation member of the Association, a sincere friend of Geography and an efficient, energetic and sympathetic educational officer. Believing among other things that the position of Geography in the High School along with that of the other general knowledge subjects was jeopardised by the 1934 S. S. L. C. Scheme, he took active steps in restoring the 1929 scheme, whereby Geography continued to be one of the compulsory subjects of the S. S. L. C. Course.

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In opening the First Summer School of Geography conducted by the Association in April 1928, he spoke as follows:—"There is one particular thing in which I specially want the audience to do something. It is closely connected with a subject in which I am most interested at this time, viz., elementary education. Now one of the great problems relating to elementary education is that of the supply of good text-books in vernacular. As Chairman of the Geography Sub-Committee on Text-books, I have had opportunities recently of looking into the existing district and taluk geographies. I am sure that Mr. Subrahmanyam would agree with me that not one of them was prepared on right lines. Everyone of those local geography books contain not less than 80 pages, but of these nearly 60 pages referred to general geography of the world, and the remaining 20 pages contain some meagre facts of local geography, written in a logical, stereo-typed dull manner. It is in this connection that I want the help of the audience. You are mostly mofussil teachers and have come from all parts of the Presidency. You know your localities well; and now that you are getting a further course of training in your subject, I would suggest to you, when you go back to your places, to try and produce good text-books of local Geography for the district, the taluq and the town, on quite modern lines. By doing so, you will be helping me in the cause of elemenary education with which I am just now concerned."

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Again, in declaring open the Seventh Summer School of Geography in April 1935, Mr. Champion said :—"I am struck by the practical character of the school, which has eschewed all idealistic teaching. I feel sure that the teachers attending this Summer

School will leave the course with the feeling that the money, time and energy which they have spent here are all well spent. I feel sorry that educationists in general and teachers in particular have not realised what an excellent and efficient organisation the Madras Geographical Association is. I feel sure that the Madras Geographical Journal, the organ of the Association, can face comparison with any similar journal of the West. I have no doubt that the Madras Geographical Association is a live, energetic and progressive Association; and I attribute all that success to the selfless devotion of its Secretary to the cause of Geography. One would hear less about the defective nature of secondary and other stages of education if all school subjects had their own Associations and Journals like the Geographical Association."

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We have also the painful duty of recording the premature death of another earnest member of the Association, Mr. B. V. Narasinga Rao, Geography Assistant, Muthialpet High School, Madras. He was a member of the Working Council of the Association during the year 1932-33.

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Two meetings of the Association were held in August 1935. At the first of them presided over by Prof. V. Rangachari, M.R.Ry. Diwan Bahadur K. S. Ramaswami Sastri Avl., spoke on "Indian Geography as the key to the Ramayana, and the Ramayana as the Key to Indian Geography." At the second meeting, Mr. V. R. Ramachandra Dikshitar read a paper on the Anthropo-Geography of the Dekhan with Mr. Geogre Kuriyan in the chair. This paper is published in this issue.

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The Inaugural Address of the Coimbatore Branch of the Association was delivered on 23-9-35 by M.R.Ry. Rao Saheb C. M. Ramachandra Chettiar, the subject of the Address being "*The Noyyal Basin—a Topographical Survey.*" It is also included in this number.

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Mr. V. Satyanarayana continues as the Secretary of the Vizagapatam Branch, and Dr. C. Ramamurti has been elected its President for the year 1935-36. Under its auspices an excursion was conducted to the Chattikona summit in the Bissamkota Agency.

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Dr. H. Gravely, Superintendent of the Madras Museum has contributed to this number a paper on "*Museums as Aids to Geography Teaching.*" The subject has been treated with special reference to the Madras Museum.

The Standing Committee of the Association met on 26-10-35, and prepared a Questionnaire regarding the qualifications for the teachers of Geography in the High Schools and Training Schools in the Presidency. It is hoped that, if there is proper response, this investigation would lead eventually to a general improvement in the teaching of the subject.

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The Working Council at its last meeting in October 1935 resolved to arrange for the Decennial Celebration of the Association in January or February next by organising a week's course of lectures in Madras. It is expected that mofussil branches and members would organise similar lectures at the same time, in their localities.

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The next Conference of the Association will be held at Salem during May next, when, following the precedent of previous years papers on various aspects of the Geography of Salem District will be read by specialists, each in his own line. Excursions will also be arranged to places of geographical interest in the district.

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The departmental Scheme of Work in Geography together with the Syllabus for forms 1 to 3 is printed in this number. It is proposed to conduct the next Summer School of Geography in April 1935 specially for the benefit of teachers handling Geography in Middle School classes and in Training Schools, when a discussion of the princples of this Scheme and Syllabus will form part of the course. Further details about it will be published in January 1935.

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It is understood that the District Educational Officer, Tinnevelli is arranging to organise a Refresher Course in Geography during the ensuing Christmas holidays for the benefit of teachers of Geography in the district. The course will be conducted by Mr. T. S. Sundaram Ayyar, the Geography assistant of the Tirthapathi High School, Ambasamudram. Mr. Sundaram Ayyar is an earnest and experienced teacher of Geography; and his school is one of the best equipped in the Presidency with geographical apparatus and appliances. It is hoped that instead of stopping merely with lectures, emphasis will be laid on practical and field work as well as on excursions.

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The Government Training Institution, Trichur has organised a week's educational tour by bus to Palghat, Coimbatore, Nilgiris and Mysore. The party will consist of 8 teachers, 50 students

under training and 5 pupils of the Model School; and it is to be conducted by Mr. T. S. Venkatadri Iyer and Sri. P. Kalliani Kutty Amma. It is pleasing to note that the Government has promised a grant of Rs. 200 towards the cost of the tour, besides paying the T. A. of the teachers in charge of the party.

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The Secretary of the Association returned from his European tour about the middle of October. He will address the Association about his experiences and impressions early in December.

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A scheme of Regional Survey under the title of *Exploration*, published by the Le Play Society, London is reprinted in this issue. It is proposed to prepare an adaptation of it for South Indian Conditions, and publish it in a future number of the Journal.

Reviews

India in the World. By Eva D. Birdseye, (Macmillan & Co., Ltd.) 1935. Price annas 8.

This is a text-book written by a qualified and experienced teacher of Geography, in accordance with a recent Departmental Syllabus, now held in suspense. Whatever reasons there may have been for changing the rest of the S. S. L. C. Syllabus, this part of the Syllabus on India is certainly an improvement on the old one, containing as it does general principles of World Geography, indications for local study and a good deal of practical work. It is hoped that when permanent decisions are taken, so far as India is concerned this syllabus will be preferred.

The subject has been treated in a simple and clear way; and difficult and abstract topics have been dealt with in an easy and concrete manner. The book has been well illustrated with a good number of useful sketch-maps and diagrams; and suggestions for practical work have been appended at the end of each chapter.

Other Children's Homes. By D. M. Forsaith, (A. & C. Black, Ltd.) 1935. Price 1s. 6d.

This book forms the first of a graded series of text-books, prepared for English children of about 7 to 11 under the general editorship of H. Clive Barnard. Starting with a simple account of a home settlement, a farming district and a factory town in the British Isles, the children are given glimpses of life in a few select typical regions of the world such as Norway, Russia, Palestine, Ceylon, Japan, a Canadian ranch, Labrador, the Amazon forest, etc. The subject has been presented in a manner that provides a living and practical interest throughout; and the language is remarkably simple. The volume is illustrated with 120 pictures aptly chosen to throw light on the descriptive matter; and the fly leaves at the beginning and the end contain sketch-maps of England, Europe and the World with characteristic pictures of habitations of the regions described, marked in proper location. The get-up is very neat and attractive.

Life and Work in Britain. By J. C. Kingsland. (A. & C. Black, Ltd.) 1935. Price 2s.

This is the fourth book of the same graded series, and is intended for use by children of about 11 years. The language and matter are consequently more advanced than in the first book. After explaining in the early chapters the method of keeping a Geography scrap-book and of using and reading maps, children are given peeps at the different industries of the British Isles such as farming, mining, metal work, textiles etc., closing up with a treatment of trade and transport and of the three capital cities, Dublin, Edinburgh and London. The method followed is that of interesting narration with suggested practical exercises at the end of each chapter. The volume is copiously illustrated with good pictures, maps and diagrams. This series can be strongly recommended for use as text-books in European schools, and for non-detailed reading in other schools.

How To Look At Geographical Pictures. By W. J. H. Watkins and H. S. L. Watkins, (Macmillan & Co., Ltd.) 1935. Price (paper) 1s. 3d., (cloth) 1s. 6d.

Though the use of pictures as geographical material has now been generally accepted in theory, it is not known to be so commonly used in this country, or used in the right way. We, therefore, have much pleasure in welcoming this small volume not only for use by pupils directly, but also as a guide for young teachers of Geography who will find the Hints on the inside of the wrapper particularly valuable. The 24 pictures, which have been carefully chosen for their geographical interest are representative of different types of human landscape; and the suggested questions under each of them have been answered at the end. The use of the book is sure to promote a keener observation of pictorial material as an aid to geographical study.

Books and Journals Received

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